

SOUTHERN POWER AND INDUSTRY

JANUARY, 1956

SPI's 52nd Year

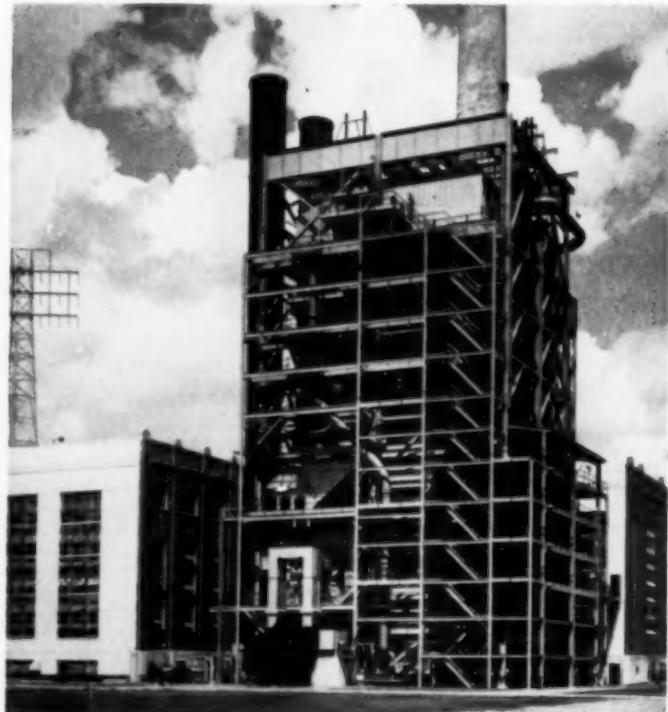
HELPING THE MAN-IN-THE-PLANT

Southern and Southwestern plant engineers and maintenance men report on plant-tested ideas, methods and gadgets.—See page 64.

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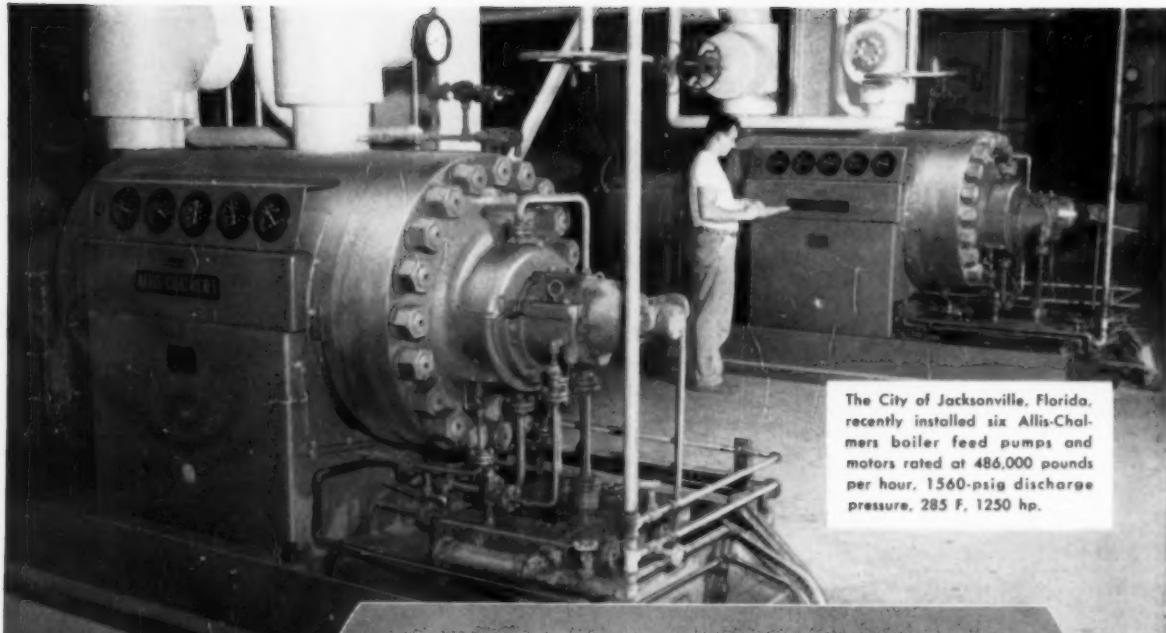


The NEW . . . With the OLD 165,000 kw Extension — Texas



IN HOUSTON, TEXAS, a 165,000 kw, 1800 lb extension to Houston Lighting & Power Company's Deepwater Station has been installed in-line with five older units. A new 1,200,000 lb/hr generator is of semi-outdoor type. Station now has an approximate developed capacity of 315,000 kw. Semi-technical description, cycle diagram, and detailed specification data are featured in this issue.

See Page 40



The City of Jacksonville, Florida, recently installed six Allis-Chalmers boiler feed pumps and motors rated at 486,000 pounds per hour, 1560-psia discharge pressure, 285 F, 1250 hp.

**City of
Jacksonville**

Another User of Reliable **ALLIS-CHALMERS** barrel-type **PUMPS**

*Here are the reasons
for wide acceptance
of these pumps:*

- Outstanding performance — fully proved by service records.
- High efficiency and smooth operation under fluctuating loads — first stage has twin, single-suction impellers for low NPSH requirements.
- Simple maintenance—expansion joint and shaft seals are brought to outside of pump where they can be easily inspected.
- No balancing device needed—axial balance is maintained by back-to-back mounting of the impellers.

THERE are outstanding features like these throughout the Allis-Chalmers line. Whether you require boiler feed, condensate, circulating or other power plant pumps — it pays to standardize on Allis-Chalmers.

In addition, A-C can supply pumps, motors and control of coordinated design and manufacture. This means one responsibility — one guarantee of satisfaction.

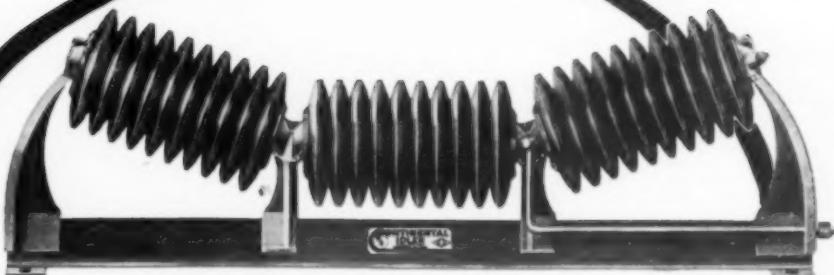
Get complete information on barrel-type boiler feed pumps. Call your nearby A-C office or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin for Bulletin 08B7899.

A-4854

ALLIS-CHALMERS



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spark-proof for those whose need is strength AND lightness. Extra safe and strong. Allowable fiber stress 15,000 psi. Modulus of elasticity 10,000,000 psi.



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where it is desired to
match existing grating.

The top half of the spread shows a large image of a grating sample with a "FILE WORTHY" stamp. The bottom half shows a stack of grating samples with a "HOW WELDFORGED Steel Grating & Stair Treads Are CUSTOM ENGINEERED for YOU" banner.

The right side of the spread features a "NEW" catalog for "KERRIGAN Weldforged" stainless steel floor grating. It highlights features like "Rust Proof", "Chemical Proof", "Non-Magnetic", "High Heat Resistant", and "Highly Corrosion-Resistant". The catalog also features the Kerrigan logo and the text "KERRIGAN IRON WORKS, INC. GENERAL SALES OFFICE - 274 MADISON AVENUE - NEW YORK CITY".

At the bottom right, the text "EXTRA CLOSE SPACED PLAIN • SERRATED" is displayed.

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SOUTHERN POWER AND INDUSTRY

Vol. 74
No. 1

JANUARY, 1956



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Facts and Trends

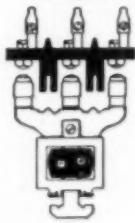
FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

January 2, 1956

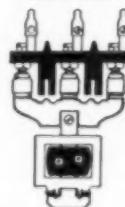
- ◆ NEW WITH THE OLD—In Houston Lighting & Power Company's Deepwater Station, a 165,000 kw, 1800 lb extension has been installed in-line with five older units. New Riley Stoker Corporation 1,200,-000 lb/hr generator is of semi-outdoor type. Station now has an approximate developed capacity of 315,000 kw.
Semi-technical description of the extension; photos of turbine, boiler and condenser pit; cycle diagram; and detailed specification data are featured in this issue of SP&I.
- ◆ UTOPIA FOR THE PLANT ENGINEER is predicted in the occasional product descriptions crossing our desk of the water treatment gadget classification. They claim to eliminate and prevent scale and corrosion formation in water systems and boilers without the use of chemicals. Nothing moves and there is no "expensive" labor or chemical servicing.
Latest water conditioner announced is claimed to be "the first important application of nuclear physics principles to the effective treatment of industrial water problems. Scale formation is prevented by imparting added energy to the atoms of the water solution." We should have one connected to our office fountain—perhaps it would help production during those early Monday morning hours.
- ◆ INCANDESCENT LAMP DEVELOPMENT—15% increase in light output for incandescent lamp bulbs used in industrial lighting (no additional electricity is required) has been announced by G-E. Increased light output is achieved by: improving the tungsten filament design; altering the mount structure, so that the filament is positioned lengthwise, or axially, in the bulb; and substituting coiled-coil filaments for singly coiled ones in lamps of 300 watts and larger. 750 and 1000 watt industrial lamps are now available with production soon to be extended to other sizes.
- ◆ NOW THAT EGGNOG TIME is over (official dates were December 1-31) how about sending us two or three shop-kinks or short-cuts that have proved of help in your plant maintenance work. A photo or rough sketch will make the idea more useful to other plant engineers and our payment check will help you stem the January flood of December bills.
- ◆ NEW AUTOMATIC DEMINERALIZATION PLANT, designed and built by Belco Division of Bogue Electric Mfg. Co., was recently installed at Monsanto Chemical Company's Texas City, Texas, plant.
Control panel, one of the largest ever built, stands 7 ft 9 in. high and is 33 ft long. It shows at a glance the flow pattern in any portion of the demineralization plant by means of the lighted "flow diagram" made up of flat plastic strips, each colored for a particular type of flow.
- ◆ COAL, OIL OR GAS BURNING is featured in a new prototype package boiler design. Late in November, Superior Combustion Industries, Inc.,



**CONTACTOR
OPEN**



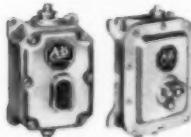
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The silver alloy used for Allen-Bradley double break contacts remains always in perfect working condition. Hence, there is no need for contact maintenance. You can install an A-B starter and forget it.

**ENCLOSURES for
Every Operating Condition**



NEMA type enclosures are available for Bulletin 609 and Bulletin 709 starters to satisfy any operating requirement.

BULLETIN 609—
Max Rating: 5 hp,
220 v, 7½ hp,
440-550 v.

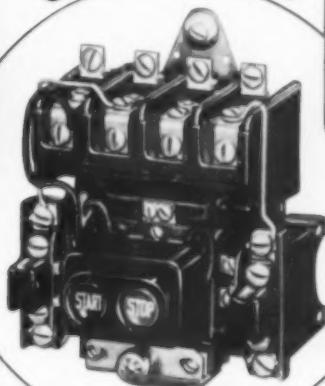
Manual



Bulletin 609

BULLETIN 709—
In 8 sizes up to 300
hp, 220 v; 600 hp,
440-550 v.

Automatic



Bulletin 709 - Troubleshooting Guide

The MOST POPULAR MOTOR STARTERS Trouble Free . . . No Contact Maintenance

These two Allen-Bradley across-the-line motor starters . . . Bulletin 609 manual and Bulletin 709 magnetic . . . enjoy world-wide popularity because no matter what the service may be, they will not fail.

Both starters are simple, assuring long, trouble-free life. Both provide dependable overload protection to the motor. Both are push-button operated . . . one, mechanically through a snap-action linkage,

and the other, electrically with a solenoid plunger.

For continuous plant operation, specify either Bulletin 609 manual or Bulletin 709 solenoid starters. For maximum protection to man, motor, and machine, the Bulletin 709 is best. Its "no-voltage" protective feature prevents accidental restarting of motors after power interruptions. Write for the A-B Handy Catalog —6th Edition.

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KNOXVILLE—Boditch & Co., 1311-C N. Broadway, P. O. Box 3145, Tel. 4-2513

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ST. LOUIS—Harold Julian, 904 N. Grand Blvd., Tel. Jefferson 5-1901
SAN ANTONIO—Wilson Elect. Equip. Co., 101 E. Maple St., Capitol 4-2344
SAN DIEGO—James A. Setchell Co., Inc., 301 W. "G" St., Tel. Belmont 3-3981
TULSA—John W. Elder Co., 1526 East Fourth St., Tel. Diamond 3-9149

Facts and trends (continued from page 4)

conducted a highly successful factory test of a new 12,500 lb/hr packaged water tube boiler designed primarily for coal firing and also equipped to utilize oil and gas.

Unit is designed for field assembly as a packaged unit, thus reducing field labor and total cost. Designers have eliminated the high refractory base previously employed for small capacity packaged water tube oil or gas-fired steam generators when converted for coal firing. For details check "Equipment . . . Methods . . . Supplies" in this issue.

- ◆ SELF-VULCANIZING rubber repair material makes it possible to quickly repair bruises, tears and edge damage on conveyor belts without the use of heat or heavy vulcanizing equipment. In the Flexible Steel Lacing Company's "Rema" development, vulcanization is a chemical process. Since no curing time is required, belts may be returned to service as soon as repair work is completed.

- ◆ ONE OF THE SOUTH'S most active industrial citizens is the General Electric Company. During the past ten years, G-E has invested about \$250 billion in 19 new plants in 10 Southern States.

Newer plants soon to reach full production include: Hendersonville, N. C. (outdoor lighting); Hickory, N. C. (distribution transformers); Irmo, S. C. (aluminum electrolytic capacitors); Tyler, Texas (home air conditioners); Lynchburg, Virginia (rectifiers); and Roanoke, Virginia (industrial controls).

- ◆ POWER INDUSTRY NOTES—Steam-electric generation from conventional fuels seems likely to be increasingly important in power generation despite development of nuclear fuel powered generating stations. It now accounts for 75% of all electric power generated. Remaining sources are hydroelectric plants which produce 23% of the total, and internal combustion engines with 2%.

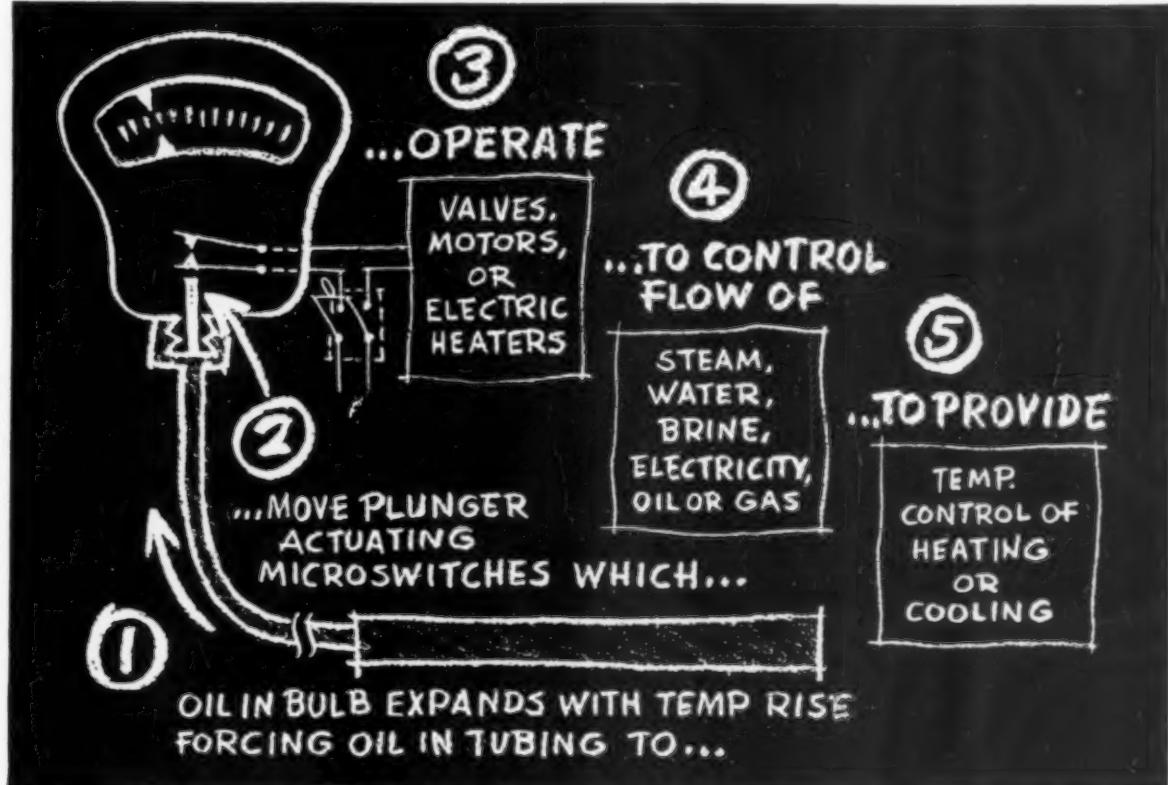
Nuclear energy for power production is expected to be of major importance and will become a significant part of the total power capacity within 25 years. Total use of heat and power has been increasing at a tremendous rate and continues almost wholly dependent on irreplaceable heat sources such as coal, oil, and natural gas.

Total recoverable energy from these sources is far below our energy requirements for the future. These must be supplemented and at present nuclear sources appear to be most promising.

Assuming that the total electric power requirements of the U. S. increases 6.5% per year, it has been estimated that by 1980 conventional steam-electric generation capacity will be more than four times present capacity and that nuclear energy for electric power production might be one-fourth of the total.

- ◆ DON'T TAKE THAT \$64,000 QUESTION—Pocket the \$32,000 check, head for home and get back on the job. Experts from here and there say the odds are against you. Take the taxes out of the first \$32,000 and you have a balance of about \$16,000. But if you try and do answer the \$64,000 question, you will only gain about \$8,000 more—and it's just not worth the risk. So, take the \$32,000 check, send us \$3 (to renew your 2-year SP&I subscription) and deposit \$31,997 in the bank for taxes and a rainy day.

Write the editors for additional information on any of the above items.
SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 5, Ga.



INDICATING Automatic Temperature Control

It's simple...dependable!

That rough sketch above tells the story. It shows Sarco's simple electric indicating temperature control . . . and what it can do for you.

Really mighty simple, isn't it? Yet, it's adjustable, indicating and provides dependable accuracy to $\pm \frac{1}{2}^{\circ}\text{F}$. No gadgets that call for a technician to read and repair! So simple, so trouble-free . . . maintenance is seldom, if ever, needed.

Turn one knob to change the temperature control setting. Large, easy-to-read scale shows you both the actual and the set temperature.

SEQUENCE CONTROL

And this Sarco electric temperature control is versatile . . . it offers you many sequence combinations such as:

- Step-heating
- Heating and cooling
- Wide limit control
- Temperature control plus operation of signal devices

Cost . . . only about \$100! It's good economy to specify AUTOMATIC temperature control for ALL control jobs, not just the big ones. So mail the coupon now for complete information.

SARCO

Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

Please send information on your simple, inexpensive temperature controllers:

Self-powered type for use on _____

Electric indicating type for use on _____

Name _____

Firm _____

Address _____

City _____ State _____

2147-B

NEWS for the South and Southwest

Cameron & Barkley Handling Multi-Amp in Southeast

The Cameron & Barkley Company, distributor of industrial supplies, with branches at **Charleston, S. C.**, **Savannah, Ga.**, and **Jacksonville, Tampa, Orlando and Miami, Fla.**, has become distributor for Multi-Amp, a portable high current test instrument manufactured by the **Multi-Amp Corporation** of Newark, N. J.

Multi-Amp, which tests electrical

protective equipment such as circuit breakers, relays and reclosers, is a practical and economical method for accurately calibrating this equipment under actual operating conditions, thereby reducing to a minimum burned out motors, fires and premature trip-offs.

It is being used in all industries which depend heavily on electric power . . . paper, chemicals, textiles, food, petroleum, metal producing and manufacturing, utilities, ordnance and shipyards.

Sales and service of Multi-Amp

test instruments will be coordinated under **Charles Von Glahn**, Manager of Cameron & Barkley's Electrical Division.

Kinnear Now V.P. of Operations at T.C.I.

Appointment of **J. W. Kinnear, Jr.** as vice-president—operations of the **Tennessee Coal & Iron Division** of the United States Steel Corporation has been announced by Arthur V. Wiebel, TCI president. Mr. Kinnear succeeds **J. M. Spearman**, who becomes assistant to president of TCI.



More Dixisteel From New Electric Furnace

Southern steel production received another boost recently when **Atlantic Steel Company's** new electric furnace began operations. The giant Lectromelt top-charge furnace is the second such unit to be installed by the **Atlanta, Georgia**, firm within the past three years.

With a rated capacity of 75 tons, the furnace can produce more than 125,000 tons of steel annually, increasing the company's total ingot capacity by 30%. The two furnaces are the largest in the Southeast and are in addition to the firm's three open-hearth furnaces.

The two electric furnaces use more electrical power than a residential city of 80,000 population. A new dust collection system has been installed in the electric furnace building to eliminate the dust and smoke generated by the melting operations.

Atlantic Steel Company, now the largest producer of electric-furnace steel south of Pittsburgh, is a wholly independent producer and locally owned.

American Blower — Kansas Texas & Tennessee Offices

Establishment of new district offices in **Wichita, Kansas**; **San Antonio, Texas**; and **Nashville, Tennessee** has been announced by Mr. E. W. Petersen, sales manager of **American Blower Corporation**, Detroit 32, Michigan. The new locations will expand to 53 the number of American Blower district offices for providing assistance to users of air handling, heating, air conditioning and fluid drive power transmission equipment and refrigerating machines in the United States.

The **Wichita** office will have as manager **O. J. DuPree** who was formerly assigned to the Kansas City district. DuPree received his engineering degree from University of Missouri. He joined the Company early in 1955.

W. F. Markey heads up the new district office at **San Antonio**. A Notre Dame graduate with a degree in mechanical engineering, Markey has been with American Blower since 1951. He formerly served as sales engineer for the Washington, D. C., and Dallas, Texas, offices.

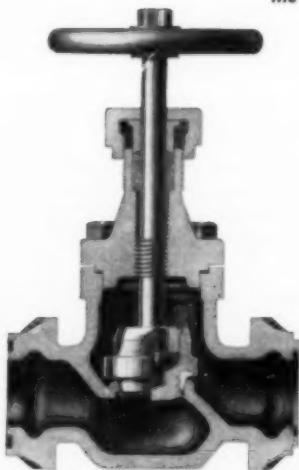
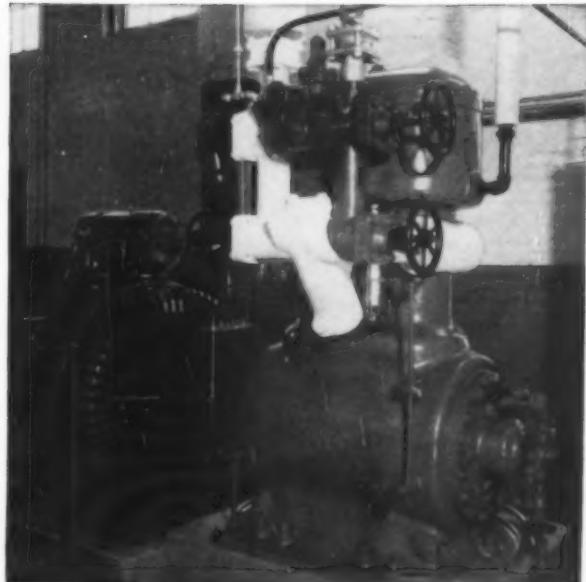
The **Nashville** office will be managed by **B. G. Kemp** who transfers from the company's Cincinnati office. Kemp has been with American Blower since 1950 and is a mechanical engineering graduate of Tennessee Polytechnic Institute.

Turn Page for More News

For the Ultimate in Ammonia Equipment Specify



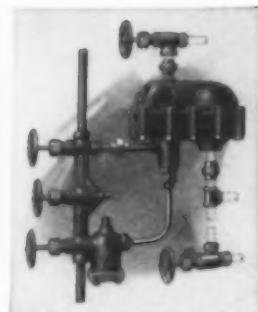
Frick Enclosed Ammonia Compressors—The Standard of the Refrigeration Industry



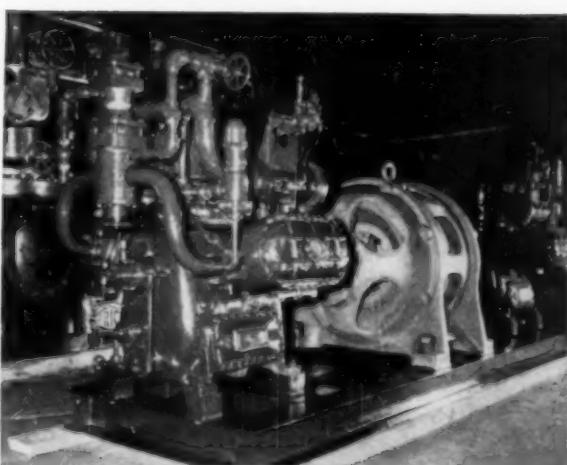
Frick Valves Have High-angle Seats and Oversized Stems, Are Good For Many High-pressure Jobs



Condensers, Coils and Coolers Are Furnished in All Types and Sizes



Float Control Valve with By-pass Manifold and Strainer



"ECLIPSE" Ammonia Booster and High-Pressure Machines Have Multiple Cylinders, High Running Speeds

Whether you need a compressor, condenser, cooler, coil or control—you get only the most dependable when you insist on equipment bearing the Frick trademark. Generations of experience with ammonia refrigeration are back of our recommendations and products: write for literature and estimates on your requirements.

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA.
U.S.A.

Also Builders of Power Farming and Sawmill Machinery

A-C Tampa, Fla., District

Henry M. French has been assigned to the Tampa district of Allis-Chalmers Industries Group as a processing machinery sales representative.



News for the South & Southwest (Continued)

David E. Long Corp. Names Southeastern Coating Repr.

Frank M. Stewart, III, Box 101, Gray, Georgia, has been appointed a representative of the David E. Long Corporation's Del protective coatings for Georgia, Northwest Florida and the coastal section of South Carolina.



Mr. Stewart, a graduate of Georgia Tech, has had considerable experience in the corrosion barrier field.

Del protective coatings include: synthetic rubber caulking compounds, vinyl copolymer resins,

modified epoxy resin, acrylic resin, modified silicone resin, masonry coatings, metal primers and vinyl acetate.

Riechman-Crosby Now Carborundum Distributor

The Carborundum Company of Niagara Falls, New York, has appointed a new distributor, Riechman-Crosby Company 223 S. Front Street, Memphis, Tennessee, to augment its sales and technical services to southern industry.

Announcements have been sent to Carborundum's customers in the Tennessee, Arkansas, Mississippi areas announcing Riechman-Crosby's appointment as their new exclusive distributor of Carborundum grinding wheels, coated abrasives, sticks, stones and polishing grain.

Riechman-Crosby is a well known southern machinery, mill and electrical equipment supply house. Started sixty years ago, it has grown into an organization employing some 85 people. Known as one of the oldest mill supply houses in the south, the firm carries a very extensive inventory supply.



Le Roi's Southwestern Headquarters — Tulsa

Completion of the most extensive branch facilities of any engine manufacturer serving the petroleum and construction industries has been announced by the Le Roi Division of the Westinghouse Air Brake Co. Le Roi manufactures internal combustion engines, heavy-duty portable and stationary air compressors, and air tools for the construction and mining industries.

Headquarters for Le Roi's Southwestern Sales Region, as well as its Petroleum Industry Headquarters, is the new branch plant located at 5000 45th West Avenue, Tulsa, Oklahoma. The plant includes modification and assembling facilities, a replacement parts store, an extensive warehouse, and offices for the division's Southwestern Sales Region and Petroleum Industry Headquarters.

FUTURE EVENTS of Engineering Interest

PLANT MAINTENANCE AND ENGINEERING SHOW, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 23-26, 7th Plant Maintenance and Engineering Show and Conference, Convention Hall, Philadelphia, Pa.

INSTRUMENTATION CONFERENCE, Chemical Engineering Department, Texas A&M, College Station, Texas. Jan. 25-27, 11th Symposium on Instrumentation for the Process Industries, Texas A&M, College Station, Texas.

EDISON ELECTRIC INSTITUTE, 420 Lexington Ave., New York 17, N. Y. Feb. 6-10, National Industrial Electric Heating Conference, Netherland Plaza Hotel, Cincinnati, Ohio.

SOUTHERN SAFETY CONFERENCE, INC., W. L. Groth, Executive Director, Box 8927, Richmond 25, Virginia. March 4-6, 17th Southern Safety Conference and Exposition, Biltmore Hotel, Atlanta, Georgia.

ELECTRICAL CONFERENCE as applied to pulp and paper industry being sponsored by Jacksonville, Florida, section A.I.E.E. and College of Engineering of University of Florida. March 8-9, Conference on Electrical Engineering, University of Florida, Gainesville, Florida.

More News—Page 88

**the seal of quality in
water tube boilers...**

ESTABLISHED 1864



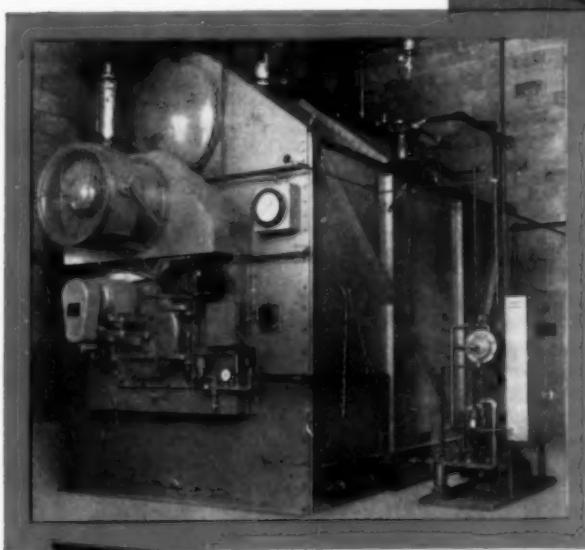
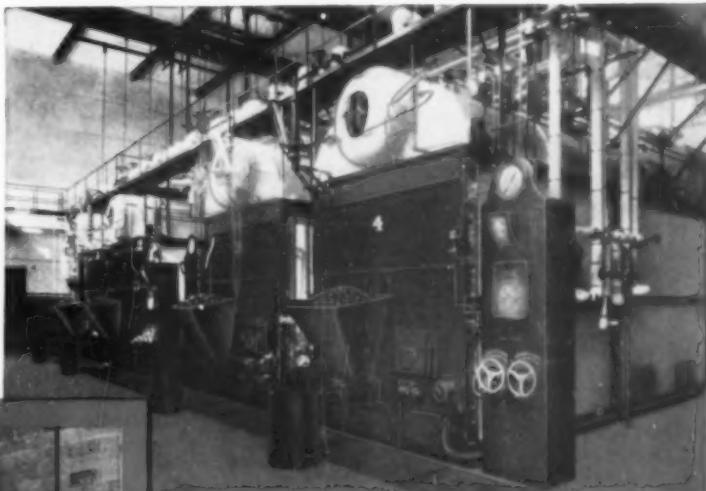
KEELER

WATER TUBE

PACKAGE STEAM GENERATORS

Original of their type...Recognized Quality

Twenty years ago, the Keeler CP Steam Generator introduced what we know today as "Package Boilers", with the incorporation of furnace water wall design in a package unit for both large and small boiler users. Prior to 1935, this principle was uncommon except in large high pressure installations in utilities and larger industries. The CP became a pacesetter with its large power plant resources in package form by providing a reliable, efficient source of low cost steam for power, process and heat requirements in thousands of operations throughout the nation and abroad.



KEELER Type CPM

A modification of the CP for gaseous fuels use. An economical forced draft, pressurized furnace unit complete with burning equipment and accessories attached. Pressures to 325 psi, steam capacities to 34,000-lbs. per hour.

KEELER Type CP

Original of the package steam generators, the CP delivers high efficiency with any method of firing (induced, natural or forced draft). Available for all types of fuel and readily convertible at minimum cost. Operates at high overloads without disturbing water level. More steam capacity in a given space and larger combustion chamber with less head room than any other type. Made in a wide range of sizes, in pressures to 500 psi with capacities to 150,000-lbs. of steam per hour.

KEELER Type DK

Newest package unit in the Keeler line—a new, compact, low cost package unit (oil or gas fired) for small space requirements. Pressures to 325 psi, steam capacities to 45,000-lbs. per hour.



Write For Bulletins

- No. F-14: Type CP Package Boilers
- No. M-2A: Type CPM Package Boilers
- No. DK-1: Type DK Package Boilers



E. KEELER CO.

WEST & CHURCH STS. • WILLIAMSPORT, PA.

— OFFICES IN PRINCIPAL CITIES —

New Plants — Expansions

- ✓ Manufacturing Plants
- ✓ Utility Plants
- ✓ Large Service Plants

Highlights for January, 1956

South Atlantic States

Newport Industries' new naval stores and related chemical plant under construction at **Bristol, Florida**, expected to be in operation by Sept., '56 . . . **Simmons Company** building new \$2,000,000 bedding manufacturing plant at **Jacksonville, Florida** . . . **Florida Power Corporation** plans \$7,000,000 generating plant for **Mermaid Point, Florida** . . . multi-million-dollar chemical plant by the **Glidden Company** at **Port St. Joe, Florida**.

Joseph T. Ryerson & Son constructing **Charlotte, N. C.** steel service plant . . . 8,000 sq ft, \$1,000,000 **Parks-Cramer Co.** addition underway in **Charlotte, N. C.** will increase air conditioning equipment production . . . \$1,000,000 **American Bakeries Company** plant scheduled for early '56 completion in **Fayetteville, N. C.**

600,000 sq ft, multi-million-dollar **Carlisle Finishing Co.** plant scheduled for Sept., '56 completion at **Carlisle, S. C.** . . . 39,000 sq ft, \$175,000 addition being made to **Union Pier** warehouse facilities at **Charleston, S. C.** . . . 25,000 sq ft **Owen Joist Corp.** plant at **Orangeburg, S. C.** will manufacture long span joists.

\$22,000,000 expansion of **Virginia Electric and Power Company's** **Bremo Bluff, Virginia**, plant includes a 150,000 kw generating unit with completion in July, '57 . . . late summer production scheduled in **Ralston Purina's** 75,000 ton per year feed plant in **Richmond, Virginia**.

East South Central

Ebasco Services designing and constructing \$27,-000,000 **Container Corporation of America's** pulp and paper mill at **Brewton, Alabama** . . . **F. C. Huyck & Sons** building \$3,000,000 felt plant at **Cochrane, Alabama** . . . \$32,000,000 expansion underway at **Coosa River Newsprint Company's** **Coosa Pines, Alabama**, plant . . . \$24,000,000 expansion of **Alabama Power Company's** **Gorgas, Alabama**, plant will include a 190,000 kw generating unit bringing capacity to 736,250 kw . . . **Bolkins Grain & Feed Co.** plan \$400,000 plant at **Guntersville, Alabama**.

Pennsylvania Salt Manufacturing Company's expanded **Calvert City, Kentucky**, organic chemical plant expected to reach full scale operation in 1956 . . . **Oriel Brewing Company** building \$200,000 addition to **Louisville, Kentucky**, plant . . . \$2,000,000-\$5,000,000 petrochemical plant planned by **Stauffer Chemical Company** for **Louisville, Kentucky**.

\$500,000 plant addition at **American Bosch Arma Corp., Columbus, Mississippi** . . . **Winona, Mississippi**, will be the site of a new \$300,000 **McGregor, Inc.** sportswear plant.

Mueller Company underway on \$1,000,000 expansion to **Chattanooga, Tennessee** facilities . . . new \$1,800,000 water system is in operation at **Cleveland, Tennessee** . . . **Jamestown, Tennessee**, has new \$130,000 **Sol Bergen Associates**' shirt plant under construction . . . **Vinylex Corp.** building \$50,000 **Knoxville, Tennessee**, plant.

West South Central

\$150,000 poultry processing plant at **Batesville, Arkansas** . . . **American Colloid Co.** planning \$500,000 barite mining and processing plant at **Dierks, Arkansas** . . . **Pan-Am Southern at El Dorado, Arkansas**, has \$190,000 maintenance shop modernization underway . . . preliminary plans announced for \$6,000,000 cement plant at **Foreman, Arkansas** . . . **Firestone Tire and Rubber Company's** \$220,000 expansion at **Magnolia, Arkansas**, expected to employ 600 within next four years . . . **Renovo Shirt Co. at Mena, Arkansas**, plans \$110,000 addition.

Sunray Midcontinent Oil Co. building \$3,000,000 chemical processing plant at **Corpus Christi, Texas**
(Continued on page 46)

Data taken from SPI's SOUTHERN INDUSTRIAL NEWS SERVICE, issued exclusively to SPI advertisers and their representatives throughout the South and Southwest.

**COMPLETE LINES OF WALWORTH VALVES
for POWER PLANT SERVICE**



Featuring Walworth Pressure-Seal Valves

Here are cast steel valves built for high-pressure, high-temperature service. The unique bonnet-to-body design utilizes internal line pressure for a tight, leakproof connection. The higher the pressure the tighter the bonnet joint! Bulky, heavy bonnet flanges, bonnet studs, and nuts are completely eliminated providing a modern valve design of truly streamlined proportions. Maintenance is simplified as Walworth Pressure-Seal Valves are easily assembled, disassembled, and insulated.

Walworth Pressure-Seal Valves are available in Series 600, 900, 1500, 2500, and in a wide range of sizes and types. Complete information is available from your nearby Walworth Distributor—or—write Walworth for a free copy of Circular 16.

and including these valves for "round-the-plant" use!



WALWORTH SMALL CAST STEEL Y-GLOBE VALVES. Simplified design eliminates many of the problems encountered in high-temperature, high-pressure service. No bonnet joint. Improved back-seat design means longer life for packing rings.



WALWORTH LUBRICATED PLUG VALVES. Easy turning—quick operating. Lubricant can be renewed while the valve is in service. Lubricant completely surrounds the plug ports for a tight seal against leaks. Remember, always use Walworth Lubricant in Walworth Lubricated Plug Valves.



WALWORTH BRONZE VALVES. Standardized lines of bronze valves provide an unsurpassed system of interchangeability of parts, drastically reducing inventory problems. Walseal Valves with brazing ends also available in a variety of types.



WALWORTH IRON BODY GATE VALVES. Straight-flow port design reduces fluid turbulence to a practical minimum. Seat rings of end-seated type are screwed into the body. Brass liner on glands assures greater resistance to corrosion and scoring. Available with threaded or flanged ends.



WALWORTH CAST STEEL GATE VALVES. Bolted bonnet, wedge gate, OS&Y. Bonnets and bodies are engineered to withstand pressure and minimize distortion. Heavy steel walls provide extra strength and longer life. Deep stuffing boxes in all sizes (2" to 24") insure tightness and maximum packing life. Also available in globe and angle types.

WALWORTH also offers Plastic Valves, Fittings, and Pipe of polyvinyl chloride, moulded to Walworth's specifications by General American Transportation Company of B. F. Goodrich Chemical Company Geon!

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STEAM TURBINES . . . FURNACES BOILERS, STOKERS, BURNERS

1 PACKAGE BOILERS — Bulletin

DK-1 describes company's newest compact, low cost package unit (oil or gas fired) for small space requirements. Pressures to 325 psi, steam capacities to 45,000 lb/hr.—E. KEELER CO.

6 PACKAGED PLANTS — Catalog

711 describes how steam at point of use cuts costs for process industries. Packaged generators are fully automatic, burning oil, gns, or both in combination. 18 sizes from 20 to 600 bhp and for pressures to 250 psi. — SUPERIOR COMBUSTION INDUSTRIES.

9 PACKAGED BOILERS — Bulletin

AXY-1 generally describes the features and design of "Amesteam Generators" — shows how installation of these units provide dependable low cost steam for all types of plants. — AMES IRON WORKS, INC.

21 WHAT TYPE COLLECTOR? —

Reprint 102 shows how various industrial dust and flyash problems are being solved. — THERMIX CORPORATION.

29 CONTINUOUS BLOW-OFF —

Bulletin, 8 pages—Gives the basic facts about boiler blow-off, and describes the Madden system of control of continuous blow-off for the removal of solids and impurities from steam releasing surfaces. — THE MADDEN CORPORATION.

37 STEAM BOILERS — Bulletin

SB-50, 16 pages — Describes and illustrates complete line of steam generating equipment, with sectional views, diagrams, plant applications. Condensed reference material for consulting and power engineers. — ERIE CITY IRON WORKS.

56 WATER TUBE BOILERS—Booklet

—Describes details of stoker—

oil or gas or combination gas-oil, 10 to 350 hp to 250 psi; designed for easy conversion to any fuel. — QUEEN CITY ENGINEERING COMPANY, INC.

61 ASH CONVEYORS — Catalog, 8

pages — Guide in selection of steam, pneumatic ash conveyor systems—description and illustration of special rotary feeders, cut-off valves, furnace doors —information on crushing conveying and storing of ash, also of metal turnings and reclaimed oil for metal working plants. — NATIONAL CONVEYORS CO., INC.

75 INDUSTRIAL BURNERS—Form

AD-101, 4 pages — Describes and illustrates the Hev-E gas and combination oil and gas burners for commercial and industrial use. Also described are the forced draft system and electronic controls, with charts showing capacities for five models.—CLEAVER-BROOKS COMPANY.

86 PULVERIZED FUEL SYSTEMS

—Bulletin, 29 pages—Gives information based on 50 years' experience in steam generation; well illustrated with cross-sectional drawings and graphs — gives advantages, typical installations, and descriptions of major operating parts. — FOSTER WHEELER CORP.

87 STEAM TURBINES — Single

Stage — Bulletin 500 describes features and characteristics of company's type DH steam turbines in horizontal and vertical models. — DEAN HILL PUMP COMPANY, INC.

88 INDUSTRIAL BURNERS — Gen-

eral Bulletin 751, 16 pages — Describes and illustrates industrial oil burners, gas burners, combination gas and oil burners for boilers, dryers, stills, retorts, kilns, etc., and fuel oil pumping and heating units which go therewith. — NATIONAL AIROIL BURNER CO.

95 BOILER REFRACTORIES — 20

page Bulletin R-36 contains detailed discussions of critical refractories areas in both refractory-lined and water-cooled boilers. — BABCOCK & WILCOX.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

111 CENTRIFUGAL PUMPS, SINGLE STAGE, DOUBLE SUCTION

— Bulletin 225 — Gives exterior and sectional views, engineering features and specifications, and dimensions, rating table, etc., the Type DB and DBM single stage, double suction pumps 30 to 200 gpm, 20 to 170 ft total head, 1150 and 1750 rpm. — WARREN STEAM PUMP CO., INC.

112 "PACKAGED" FANS — Catalog

515 shows how Clarge V-belt Ready Units economically answer your smaller air handling requirements. 18 sizes, wheel diameters 9 $\frac{1}{2}$ to 32 $\frac{1}{2}$ ", capacities to 12,000 cfm. Direct connected units also available. — CLARGE FAN CO.

114 CENTRIFUGAL COMPRESSORS

— Bulletin 109 — Describes single stage centrifugal compressors from 30 to 600 hp and pressures from 1 $\frac{1}{2}$ to 3 $\frac{1}{2}$ pounds pressure. Their functions, applications, ratings, construction features and arrangement are presented. — AMERICAN BLOWER CORPORATION.

120 CONTINUOUS BLOW-OFF SYS-

TEM — Publication 4081 — The savings possible through continuous blow-off as applied in many modern boiler plants. — COCHRANE CORP.

127 GENERAL FANS — Bulletin T-

158 — A general catalog — describes company's complete line of fans, including large commercial and industrial type fans designed to properly ventilate plants and other enclosures, and increase morale and efficiency.—The EMERSON ELECTRIC MFG. CO.

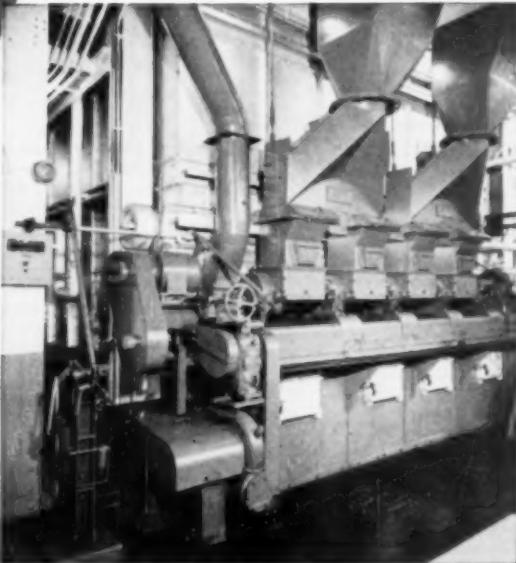
167 ROTARY PUMPS — Bulletin 307

— Describes the features and advantages, and outlines the engineering details of Blackmer rotary pumps. These have been manufactured since 1904 and
(Continued on page 16)

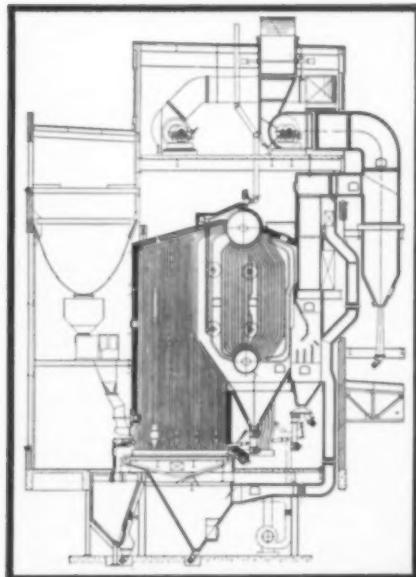
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SELECTED FOR TIRE PLANT

The B. F. Goodrich Company, Oaks, Pa.



Detroit RotoGrate Stoker in
B. F. Goedrich plant at Oaks, Pa.



This Detroit RotoGrate Stoker is installed with a Wickes two drum Steam Generator, capacity 115,000 lbs. per hour at 300 psi and 440° F. Design is based on using 350° F preheated air, when burning Fairmont District West Virginia coal. This is part of an expansion program at this plant. Detroit RotoGrate is an advanced spreader stoker with specially designed overlapping grates that move slowly forward, discharging ash at the front. Any Bituminous coal or Lignite, and many types of refuse are successfully burned. High burning rates per square foot of grate and exceptional flexibility make this stoker popular. Detroit RotoGrate will save you money—improve your operation.

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Where to Get It and How to Do It (Continued)

incorporate the outstanding advantages of "automatic adjustment for wear," and economical replacement of parts. — BLACKMER PUMP CO.

170 HEAT EXCHANGERS — Bulletins 120 & 124 describe Aero units which cool liquids & gases by evaporative cooling with atmospheric air, removing heat at rate of input, and precisely controlling temperature. Solves problems of water availability, quality or temperature. — NIAGARA BLOWER CO.

INSTRUMENTS—METERS CONTROLS—REGULATORS

205 DRAFT GAGES — Bulletins describe inclined, vertical tube, air filter gages, straight line and dial pointer type, miniified draft and receiver type gages, velocity gages and pitot tubes, gas analyzers and steam calorimeters. — ELLISON DRAFT GAGE CO.

209 LIQUID LEVEL CONTROL — Catalog — Describes Magnetrol liquid level control in which a sleeve, raised and lowered within non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Standard model can be easily adapted to meet any special requirement for pressure, temperature or corrosive liquid. Units available for controlling level changes from .0025-in. to 150-ft. with multi-stage switching when desired. — MAGNETROL, INC.

220 DIAL THERMOMETERS — Bulletin 355 describes a complete line of easy-to-read, vapor-pressure-actuated dial thermometers, available with rigid stem for use in pipe lines and tanks, or with flexible tubing for conveniently determining temperature at a point some distance from dial. — THE POWERS REGULATOR CO.

222 PRESSURE REGULATORS — Catalog 76 — Gives complete detailed information covering applications, operation and specifications of Reducing Valves, Pump Pressure Regulators and Back-Pressure Regulators. Included is a simple, practical method for selecting size of regulators. — MASON-NEILAN REGULATOR CO.

230 THERMOSTATIC CONTROLS — New Condensed Catalog No. RB24 — Describes thermostatic controls for showers, water heaters, heating, ventilating and air conditioning systems. Some of the many pneumatically operated controls employed in a Powers system are shown, as well as some of the other simple applications of a broad line of equipment. — POWERS REGULATOR CO.

239 REMOTE READING GAGES — Catalog, 8 pages — Shows complete line of remote reading gages and

accessories. A simple design transmits movement changes in mercury filled manometer, with illuminated scale, with accuracy to $\frac{1}{2}\%$ of scale reading. — JERGUSON GAGE & VALVE CO.

243 MULTI-POINTER GAGES — Product Specification M42-1 Provides description, ranges, and dimensions of Bailey Multi-Pointer Gages: diaphragm operated type for indicating draft, low pressure, and differential; Bourdon tube units for indicating temperature and high pressure. — BAILEY METER COMPANY.

264 LEVEL CONTROLLER — Bulletin F-2 describes the "Level-Trol," a level controller which is readily exchanged, replaced or repaired and which features one control for proportional band and specific gravity adjustments, using pneumatic pilot without intervening links or mechanical joints. — FISHER GOVERNOR CO.

279 LIQUID LEVEL GAGES — Unit 184, 4 pages — Illustrates and describes Jerguson reflex type liquid gages for indicating the liquid level in tanks, boilers, stills or any liquid containing vessels — discusses design, construction and application. — JERGUSON GAGE & VALVE CO.

290 PROCESS TROUBLESHOOTER — Bulletin 6-A describes the Panalarm Visual Sequence Annunciator, which flashes cause of trouble, resultant off-normals, and provides means of grouping and acknowledging related variables so that minimum interpretation is required. — PANELLIT, INC.

297 LIQUID LEVEL INDICATORS — Bulletin WG-1824, 20 pages — Describes remote liquid level indicators with application and installation recommendations, wiring diagrams, etc., for use on boilers, heaters, storage tanks and other vessels in industrial and power process plants. — YARNALL-WARING COMPANY.

PLANT EQUIPMENT—WELDING TOOLS—PROCESS SPECIALTIES

305 INDUSTRIAL HEATING — Catalog 50, 50 pages — Gives data on the type and size of electric heating units and similar equipment for industrial heating needs. Detailed diagrams and photographs describe applications. — EDWIN L. WIEGAND CO.

309 WIRE CLOTH — Catalog, 103 pages — Gives wire cloth ranges and specifications for grades from 20 x 250 mesh up to 4" openings. Illustrates facilities for fabricating wire cloth parts and fabricated alloys. — THE CAMBRIDGE WIRE CLOTH CO.

318 WROUGHT IRON — "ABC's of Wrought Iron" — A concise digest of more detailed technical handbook material on wrought iron — describes resistance to corrosion, fabrication process — where needed — shock and vibration endurance. — A. M. BYERS.

326 GRATING—FLOORING — Catalog, 12 pages — Gives picture story of "Weldforged" steel grating, flooring and stair treads — continuous spiral cross bars, alternating right and left, and slightly above bearing bars, electronically welded into inseparable units to insure greater non-skid protection and durability. — KERRIGAN IRON WORKS, INC.

328 WELDING STAINLESS STEEL — 52 page Booklet contains valuable data on the welding, brazing, soldering and hot cutting of stainless steel. — WAREHOUSE DIVISION, ATLANTIC STEEL COMPANY.

337 ATOMIZING DEAERATORS — Bulletin 4160 — Describes Cochrane atomizing deaerators, giving concise explanation of operating principle, and actual installed views of various types, designs, and sizes. — COCHRANE CORP.

345 TANKS AND VESSELS — Bulletin describes the facilities and products developed through sixty years of manufacture and erection of steel tanks and pressure vessels, smoke stacks, breechings, boilers, and the like for Southern industry. — J. FINNIGAN CO., INC.

370 WELDING ROD GUIDE — 32 page DirectoRod Guide helps you select from 160 rods those that will give you the largest savings per job, whether production, maintenance or salvage. — EUTECTIC WELDING ALLOYS CORP.

PIPING, VALVES, FITTINGS STEAM SPECIALTIES, TRAPS

**404 MALLEABLE PIPE UNIONS
AND SPECIALS** — Catalog — Describes unions, union elbows, union tees, union flanges — with ground joint brass or all-iron seats. 300-lb, 250-lb and 150-lb pressures, AAR unions. — JEFFERSON UNION CO.

410 PIPE HANGARS — Bulletin 153, 12 pages — Describes National counterpose pipe hangers for high temperature piping systems in steam plants, refineries, chemical plants, and the like. Graphs give aid in selection. Dimensions, erection and field adjustment instructions. Illustrations of typical installations. — NATIONAL VALVE & MANUFACTURING COMPANY.

415 WELDING PIPE FITTINGS — New catalog illustrates where to use Weldolet and Thredolet branch pipe fittings. Specific areas of application shown with correct installation procedure. Describes complete range of stainless,

alloy and non-ferrous fittings and Bonney's new marking standard. — BONNEY FORGE & TOOL WORKS.

416 STEAM TRAP PERFORMANCE — Bulletin T-1740, 16 pages — Describes Yarway impulse steam traps and gives their performance discharging continuously under heavy loads and intermittently under light loads. — YARNALL-WARING CO.

435 VESSEL INSULATION — Bulletin 541 gives specifications for Copr-fibre blanket insulation and metal jacketing. Low initial cost; higher insulating efficiency; and less repair at lower cost. — FORTY-EIGHT INSULATIONS, INC.

455 PLASTIC VALVES & FITTINGS — Brochure covers company's extensive line of new corrosion-resistant valves and pipe fittings molded from rigid polyvinyl chloride. — WALWORTH COMPANY.

463 JACKETED VALVES — Bulletins 220 and 221 — Describe operational features of jacketed valves for gages or wherever small jacketed angle valves are required. Full specifications, cutaway views, applications. — JERGUSON GAGE & VALVE COMPANY.

465 STEAM-JACKETED VALVES — Bulletin E-200 — Describes the design, operation and special arrangement of steam jackets for handling viscous materials such as heavy petroleum, coal tar and chemical products, which congeal or harden under operating conditions. Illustrated, with engineering data. — EVERLASTING VALVE CO.

480 PIPING FLEXIBILITY — 12 page booklet shows how various flexibility analyses techniques can cut piping design and construction costs. — THE M. W. KELLOGG COMPANY.

MAINTENANCE PACKING GASKETS, LUBRICATION

511 MAINTENANCE IDEAS — "Genius at Work" — Contains ideas about plant maintenance, bits of philosophy, new products and a description of the company's line. — KANO LABORATORIES.

518 PACKINGS & GASKET CUTTERS — Catalog, 50 pages — Describes "The Packing That Packs All," manufactured in a variety of forms such as coil, spool, loose, rings, sets, spiral, and sheet. Designates materials available. Covers gasket cutters and related items. Illustrated with photographs and drawings. — THE ALLPAX COMPANY, INC.

521 WELDING AND FLAME CUTTING OF WROUGHT IRON — Bulletin — Gives complete information on the processes and procedures used in welding wrought iron, and flame cutting wrought iron. A complete information on physical properties of wrought iron welds. Additional section on Flame Descaling. — A. M. BYERS CO.

552 CHEMICAL CLEANING — "Cut Maintenance Costs with Dowell Service," an 8-page booklet, describes a special service in the cleaning of industrial equipment with chemicals — economically,

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86	87	88	95	111	112	114	120	127
167	170	205	209	220	222	230	239	243
264	279	290	297	305	309	318	326	328
337	345	370	404	410	415	416	435	455
463	465	480	511	518	521	552	564	565
566	602	609	611	620	626	676	703	704
708	778	784	810	821	828	851	855	864
876	902	904	908	922	926	927	937	959
M-1	M-2	M-4	M-5	M-6	M-7	M-8	M-9	M-10
M-11	M-12	M-13	M-14					

Also send further information on following New Equipment (page 78).

A-1 A-2 A-3 A-4 A-5 A-6 A-7 A-8 A-9
A-10 A-11 A-12 A-13 A-14

Name Position

Company Name

Street

City Zone State

conveniently, with scientific control and reduction of outage time. — DOWELL, INC.

564 ANTI-CORROSION PAINTS — Bulletin, "The Application of Subox and Subalox Paints" — Gives the story of a complete paint system for weather, moisture and alkali protection, with details as to application. — SUBOX, INC.

565 CONTROLLED LUBRICATION — Service Handbook, 56 pages — Describes the Lubriplate film and how its application arrests progressive wear, protects machinery, cuts down costs, and serves diversified applications in industrial, utility and service plants. — LUBRIPLATE DIVISION, FISKE BROS. REFINING CO.

566 ROTARY MECHANICAL SEALS — Bulletin No. 470 — Describes rotary mechanical seals specifically designed for high temperature (hot sealing)

service. Will handle hot oils or hot water at temperatures up to 800 F. Construction is generally of stainless steel. Design allows for thermal expansion to insure efficient performance. — DURAMETALIC CORPORATION.

tions of wire mesh conveyor belts. Covers many industrial applications. Contains valuable metallurgical data. — THE CAMBRIDGE WIRE CLOTH COMPANY.

ENGINES, DRIVES POWER TRANSMISSION MATERIALS HANDLING

602 SUPERCHARGED DIESEL — Bulletin LSV-77 gives specifications on atmospheric and supercharged diesel, gas-diesel, and gas engines — vertical four cycle 12 and 16 cylinder stationary units, ranging from 1375 to 5000 hp. The LSV engine can be completely "automated" to meet specific operating conditions. — THE COOPER-BESSEMER CORP.

609 WIRE MESH CONVEYOR BELTS — Handbook, 140 pages — Illustrates and describes conveyor and conveyor belt designs, the uses and specifica-

611 BELT CONVEYORS — Catalog ID-481A — Describes Continental belt conveyors featuring standard and special idlers and many convenient accessories for application in materials handling. — CONTINENTAL GIN CO.

**620 DOUBLE PITCH CONVEYOR
AND POWER TRANSMISSION
CHAINS** — Catalog No. 34, 30 pages — Describes American Standard stock chains having figure 8 contour links, and chain pitch twice that of corresponding American Standard roller chains. — DIAMOND CHAIN COMPANY, INC.

**626 MATERIALS HANDLING
VALVES** — Data Sheet DVa covers new self-feeding, non-plugging valves which give trouble-free flow control in pneumatic transport of fly ash and other fine solid materials. Designed for air-electric, remote and manual operation. — ALLEN-SHERMAN-HOFF.

676 VARIABLE SPEED CONTROL — Catalog No. 209, 20 pages — Describes the Sterling Speed-Trol which gives variable speed control necessary for equipment adaptation; process control of

(Continued on page 20)

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1	6	9	21	29	37	56	61	75
86	87	88	95	111	112	114	120	127
167	170	205	209	220	222	230	239	243
264	279	290	297	305	309	318	326	328
337	345	370	404	410	415	416	435	455
463	465	480	511	518	521	552	564	565
566	602	609	611	620	626	676	703	704
708	778	784	810	821	828	851	855	864
876	902	904	908	922	926	927	937	959
M-1	M-2	M-4	M-5	M-6	M-7	M-8	M-9	M-10
M-11	M-12	M-13	M-14					

Also send further information on following New Equipment (page 78).

A-1 A-2 A-3 A-4 A-5 A-6 A-7 A-8 A-9
A-10 A-11 A-12 A-13 A-14

Name Position
Company Name
Street
City Zone State

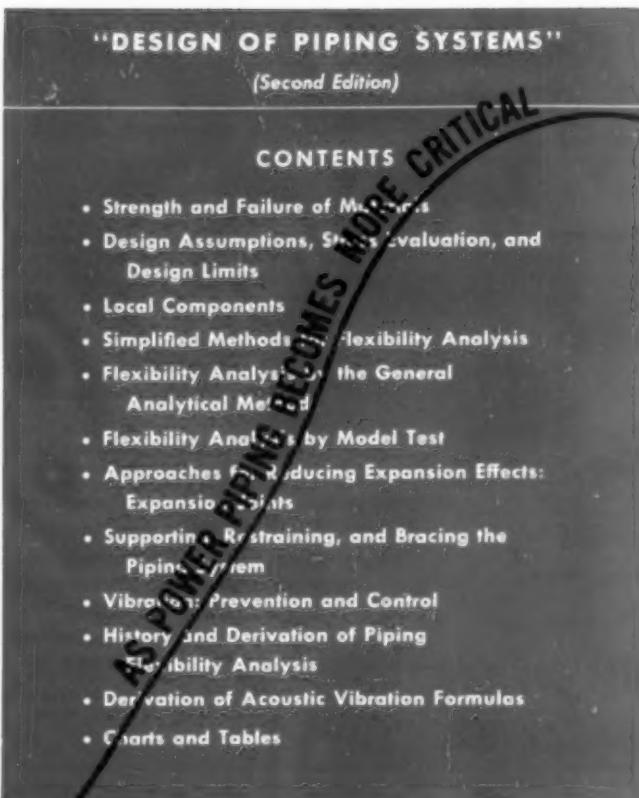


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As temperatures and pressures increase in steam-electric power plants, the problems involved in designing, engineering, and fabricating main and reheat steam piping multiply themselves many times over. This emphasizes, more than ever, the value of the long experience, in the laboratory and on the job, of The M. W. Kellogg Company—leader in the power piping field.

More evidence of M. W. Kellogg's accumulated piping design experience and ability to tackle each new power piping project in its stride, is the company's new 400-page book, "Design of Piping Systems"—to be published shortly by John Wiley & Sons. The most comprehensive work ever made available publicly on the physical design of piping, it is one of the many ways M. W. Kellogg cooperates with consulting engineers, engineers of power generating companies, and manufacturers of boilers, turbines, and allied equipment. An outline of contents is shown above.

FABRICATED PRODUCTS DIVISION

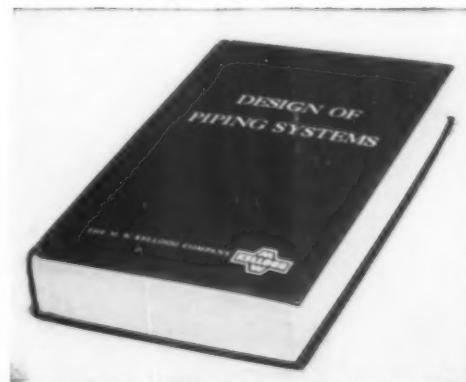
THE M. W. KELLOGG COMPANY, 225 BROADWAY, NEW YORK 7, N. Y.
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Where to Get It and How to Do It (Continued)

temperature, viscosity, level, pressure, flow, etc.; time control of baking, drying, heating, cooking, pasteurizing, soaking, chemical action, etc.—STERLING ELECTRIC MOTORS.

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AND FITTINGS** — Catalog 6, 40 pages—Describes valves and fittings for ammonia, Freon and other refrigerants, for use in industrial refrigeration, ice making and air conditioning. — FRICK CO.

ELECTRICAL

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855 WIREWOUND RESISTORS — Catalog 101 — Describes power type fixed wirewound resistors manufactured in accordance with the requirements of Military Specification MIL-R-26B—gives complete series of standard resistor values and maximum permissible currents. — SPRAGUE ELECTRIC COMPANY.

864 ELECTRICAL SYSTEM PLANNING — Book C-87 — "Power Up," 51 page book on electrical system planning, maintenance and modernization for industrial plants. Important sections on installation and maintenance of industrial electrical distribution systems; wire cable and conduit data; motor application data; and electrical systems reference data. — ANACONDA WIRE & CABLE CO.

876 LOW VOLTAGE SWITCHGEAR — Bulletin 6004 A, 24 pages—Describes I-T-E low voltage switchgear, with diagrams, photographs and other illustrations; gives information on fea-

tures, on components, on applications, on specifications and on construction. — I-T-E CIRCUIT BREAKER CO.

MISCELLANEOUS . . . SAFETY, BUILDING EQUIPMENT, METALS

902 BUILT-UP ROOFING — Bulletin 5591, 16 pages — General requirements on built-up roofing specifications including instructions for over wood, precast or poured gypsum; spray pond roofs; concrete, precast concrete slab; information on fire-resistant vapor barrier flashing details, etc. — THE PHILIP CAREY MFG. CO.

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TREADS** — 12 page catalog — Shows "Weldforged" steel construction and application—spiral crossbars, alternating right and left and slightly above bearing bars, electrically weldforged into one unit to insure greater non-skid protection and durability. — KERRIGAN IRON WORKS, INC.

**908 TRANSLUCENT FIBERGLASS
PANELS** — Data sheet shows how shatterproof panels end pane replacement. Ideal for glazing factory windows where pane breakage is high. Panels are unaffected by weather extremes or usual industrial fumes. Panels transmit almost as much light as clear glass. — RESOLITE CORP.

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927 FLOOR GRATING — Catalog No. AT254 — Describes company's free planning and checking service for completely custom fabricated floor grating installations. — BORDEN METAL PRODUCTS CO.

937 STEEL MEASURING TAPES — Complete catalog describes full line of measuring tapes from 6 to 100 ft, including wide blade tape with upright measurements. — EVANS RULE CO.

959 THERMAL INSULATION — Chart IN-6D, 11½ in. x 18 in., suitable for hanging on the wall, shows at a glance the recommended insulation for every temperature range, from minus 400 F to plus 3000 F. — JOHNS-MANVILLE CORP.

Scandinavia increases steam capacity, cuts costs burning coal the modern way

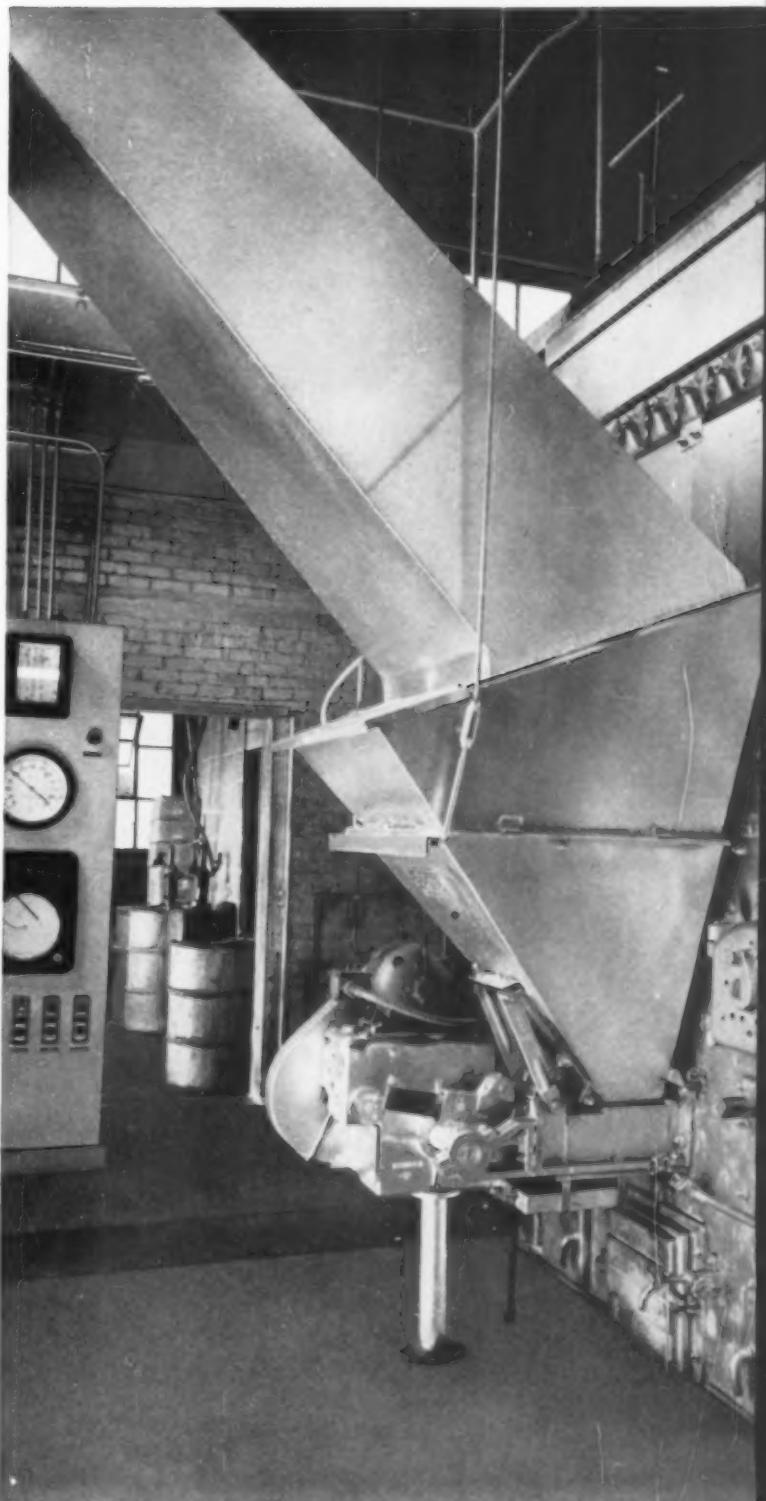
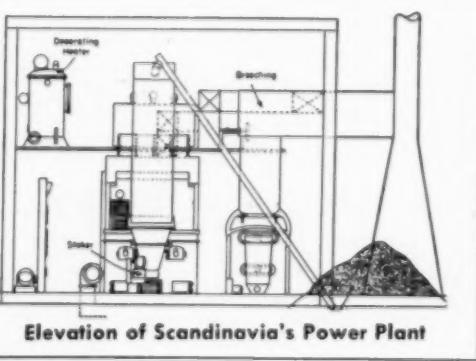
With its old power equipment overladen by an ever-increasing demand for steam, Scandinavia Belting Co., Charlotte, N.C., took stock of its power situation. Boiler room efficiency was low and maintenance excessive; pressure fluctuated and labor costs had become a problem. Deciding to modernize, Scandinavia instituted a survey of all available fuels. On the basis of cost, coal was chosen. Today, after modernization, Scandinavia's power plant has increased steam capacity 150%, reduced fuel costs 15% and cut labor costs 70%. Increased efficiency and automatic operation have reduced the work force and assured a dependable steam supply at steady pressure with ample reserve for load growth. In addition, the cleanliness of the new plant has been an important factor in raising the morale of the employees.

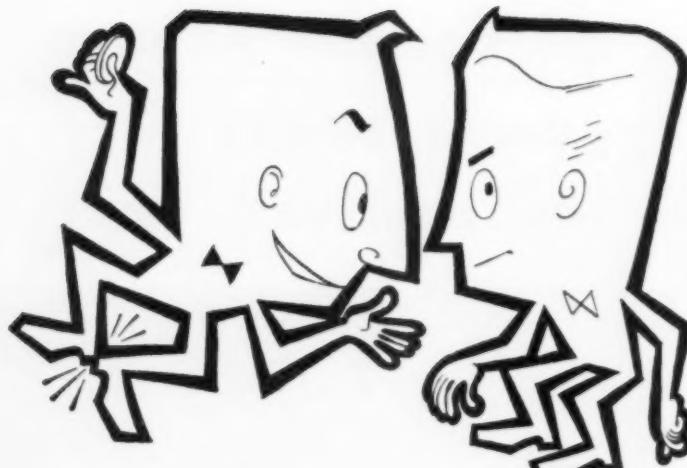
facts you should know about coal

In most industrial areas, bituminous coal is the lowest-cost fuel available • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems can cut your labor cost to a minimum • Coal is the safest fuel to store and use • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

NATIONAL COAL ASSOCIATION
Southern Building, Washington 5, D.C.





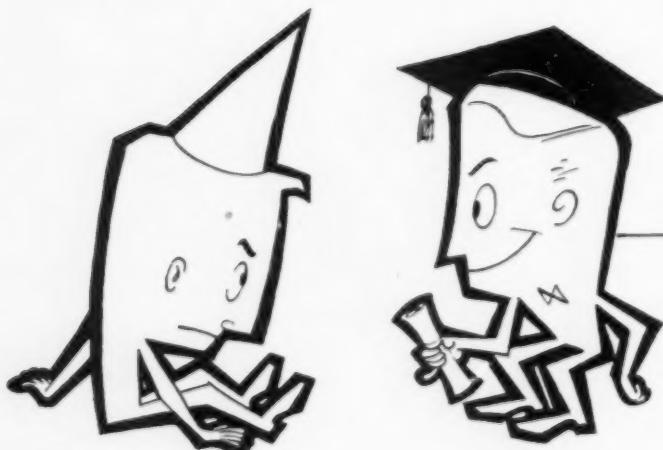
Look! I can buy coal
for much less a ton
than you're paying.

I used to buy that coal too, but it costs more per million BTU's with a whole lot more in hidden costs.



What do you mean
by "hidden costs"?

That coal you're talking about is high in ash. So we were buying ashes at the coal price, paying freight on them from the mine, then paying to have them hauled away. Your "cheaper" coal clinkers; it smokes; it fouls the tubes. That means higher labor costs and higher maintenance. Now I pay more per ton and save thousands of dollars a year.



Coals produced
on the C&O are
tops in quality.

A C&O combustion engineer showed me why this grade of coal would work best in our type of installation and our experience has shown he was right. You'd better get some expert advice. It can save you money, too.



There's a lot more to buying coal than the cost per ton. Why not contact coal producers on the C&O to solve your particular fuel requirements, or write to: R. C. Riedinger, General Coal Traffic Manager, Chesapeake and Ohio Railway Company, Terminal Tower, Cleveland 1, Ohio.

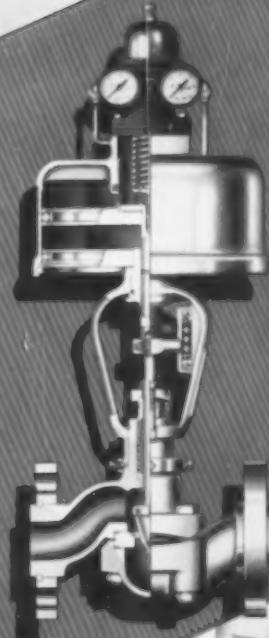
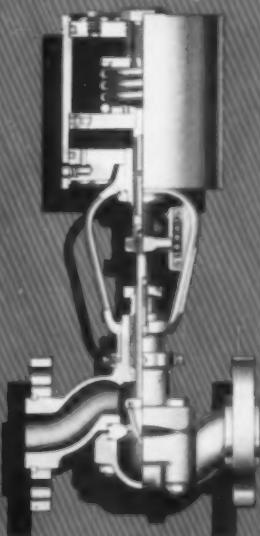
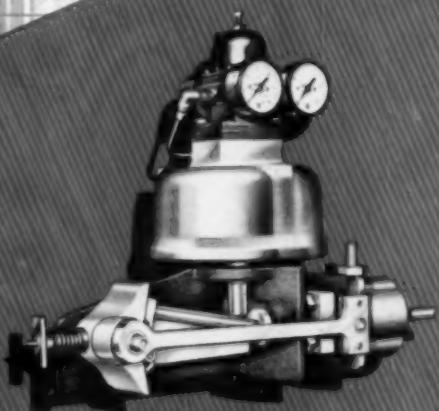
Chesapeake and Ohio Railway

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OF BITUMINOUS COAL

Reward your process WITH THE BEST IN CONTROL VALVES



You reward your process with the best in control valves when you call for Annin Domotor Control Valves, specified by engineers responsible for the most advanced processes throughout the world. Domotor control valves are no longer new, but they are still the most advanced fluid control valves available anywhere. Whether your primary problem is control accuracy, tight closure, high-resistance to erosion and corrosion, wide rangeability or low maintenance, you, too, should insist on Domotor Control Valves, produced by The Annin Company, oldest manufacturer of valves DESIGNED for modern automatic control.

Write now for your copy of Annin's new catalog on valves for fluid control.

ANNIN

THE ANNIN COMPANY

6570 EAST TELEGRAPH ROAD, LOS ANGELES 23, CALIFORNIA

Control VALVES

No time out for this CRANE valve in 40 years on main steam service



THE CASE HISTORY—Two Crane 250-pound iron body angle valves—6-inch (shown) and 5-inch size—scored this exceptional service record.

They were installed in 1915 on the main steam leads from boilers in the plant at Delavan, Wis., now occupied by The George W. Borg Corporation. In 40 years' uninterrupted service these Crane valves never failed to operate properly nor caused a shutdown. With but rou-

tine maintenance, they opened fully and were seated tight with ease under infrequent operation. Working pressure of boilers was originally 150 psi.—later reduced to 75 psi. This year, both valves were re-tired. The new replacements are Crane quality valves, of course.

Crane iron valves in particular need no introduction to thrifty buyers. In all grades, Crane iron castings generously exceed the requirements of equivalent A.S.T.M.

specifications. Crane Ferrosteel, for instance, used in 250-pound valves is 35% stronger than ordinary cast iron.

In any pressure class, you'll find Crane quality outstanding. Choose from complete lines of gates, globes, angles and checks.

Your Crane Representative can give valuable help in specifying and ordering.



CRANE VALVES & FITTINGS
PIPE • KITCHENS • PLUMBING • HEATING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

Planning a new installation?



Here's news that may save you money

When you're planning a paper mill installation, one of the most critical decisions you'll have to make is the selection of pipe or tubing. Your decision, if not just right, can be an expensive one.

To give you a hand with this important chore, National Tube has established a tubing selection service. At your request, our specialists will evaluate your job specifications from every angle, taking into consid-

eration pressures, temperatures, corrosives, etc., and will recommend the particular analysis that the installation conditions warrant . . . the material that will do the best job at the lowest cost to you. And this helping hand won't cost you a cent.

National Tube manufactures

seamless pipe and tubes in a complete range of steel analyses from low carbon, through the alloys, up to and including stainless steels. A wide range of sizes and wall thicknesses are available for every mechanical and pressure purpose. Get in touch with us at your convenience.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

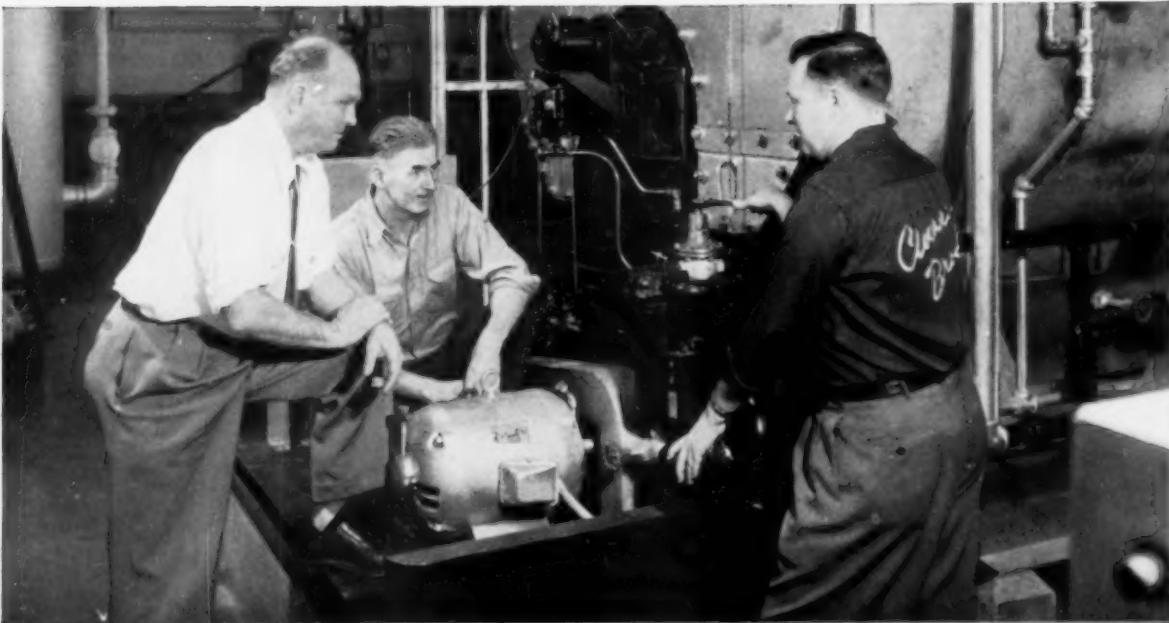


NATIONAL Seamless Pipe and Tubes



UNITED STATES STEEL

A good start is a sure way to maintain highest boiler efficiency



Cleaver - Brooks factory - trained servicemen instruct your operating personnel and adjust your boiler for peak efficiency. This service doesn't cost you a cent.

OTTO POLZIN is a typical Cleaver-Brooks factory-trained serviceman. He is shown on the job at Oilgear Co., Milwaukee, where he has just given two 125-hp Cleaver-Brooks boilers an initial start. Norbert Husting and Gordon Knischke of Oilgear are getting all the details on boiler operation and maintenance, including boiler blow-down procedure and tube cleaning.

While on his "starting service call", Otto covered all of 32 items on his check list — such as the entire lubrication system, a CO₂ reading, inspected and cleaned relay points. In short, he personally made sure both boilers were "tuned" to perfection!

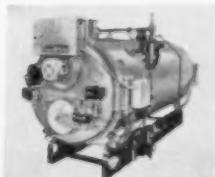
Cleaver-Brooks service is nationwide

This service is "standard practice" everytime a Cleaver-Brooks boiler is put into operation. And, as

thousands of owners know, a phone call to your local Cleaver-Brooks representative brings this and other specialized services when needed.

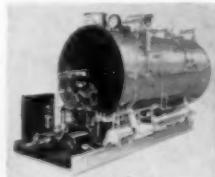
Factory-supervised starting is just one of many advantages of being a Cleaver-Brooks boiler owner. You get the ultimate in modern boiler design: forced draft with four-pass construction, hinged or davited front and rear doors for fast cleaning, 10-second gas or oil interchange — just to name a few features.

Get the full story on the complete line — sizes from 15 to 600 hp; 15 to 250 psi. Call your nearby Cleaver-Brooks representative or write direct. Cleaver-Brooks Company, Dept. A, 304 E. Keefe Ave., Milwaukee 12, Wisconsin, U.S.A. Cable Address: CEEBEEWEST — all codes. Ask for catalog AD-137.



MODEL CB — Most silent-running boiler on the market. Ideal for schools, hospitals. Sizes: 15 to 150 hp.

MODEL LR — Standard of the industry for steam or hot water service in heating or processing applications. Sizes: 200 to 600 hp.

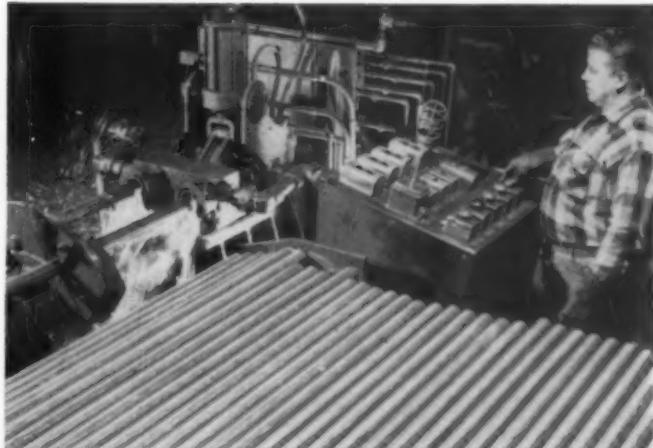


Cleaver  Brooks®

TWENTY-FIVE YEARS OF LEADERSHIP
BY THE ORIGINATORS OF THE SELF-CONTAINED BOILER

These Men at ETNA Make Sure Your SPANG CW Steel Pipe Is TOP-QUALITY

These testing and inspection experts at Etna represent you at the mill to be sure you get *top-quality* pipe every time you order SPANG CW Steel Pipe. Careful control like this is a habit at SPANG, and that's why *quality-controlled* SPANG CW is your best buy for every type of piping installation. See your local SPANG Distributor for your next pipe order!



Meet Al Badack, a member of the day-turn testing team at SPANG's Etna (Pa.) Plant. Al, who has worked at SPANG for nine years, is applying the hydrostatic water test to two lengths of SPANG CW Steel Pipe. Test pressures are applied at readings well above actual *working pressures* for which the pipe is designed. This hydrostatic test assures you that each length of *top-quality* SPANG Pipe you buy has a strong weld and will more than meet your pressure specifications.



SPANG-CHALFANT

DIVISION OF THE NATIONAL SUPPLY COMPANY

General Sales Office: Two Gateway Center, Pittsburgh,
Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston,
Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis

These men are Chester Galda and Steve Ajnnich, two members of SPANG's inspection team at Etna. Chester, a 22-year man with SPANG, is surface-inspecting coupling fit-up of SPANG CW Steel Pipe. Steve, a veteran of 44 years with SPANG, inspects each length with the aid of a fluorescent light to be sure the threads and the pipe are uniform and free of any defects. Any length that does not meet SPANG's *top-quality* specifications is rejected.



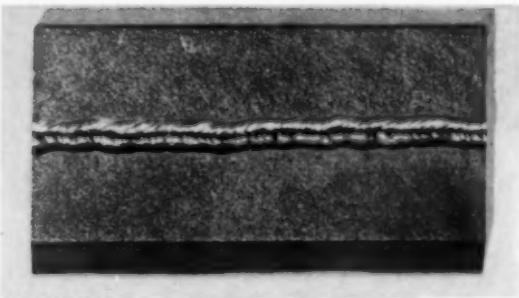
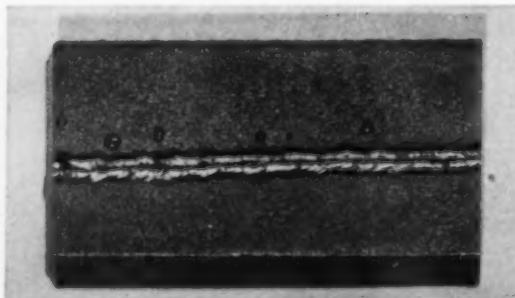
\$3800 SAVED! When a transmission housing broke on a 60-ton U. S. Naval Yard railway crane, operations were suspended. The replacement cost of \$3800 and a 6-month delay were saved with the Xyron 2-25 weldment illustrated. Careful tests proved the weld was completely free of cross checks and porosity.

Xyron 2-25 has been proven ideal for "cold" repair of large sections such as cracked motor blocks, machine bases, motor and gear housings. Xyron 2-25 makes it possible for the weldor to lay in large volumes of filler metal, run long beads without excessive heat buildup in the base metal. All the advantages of Eutectic's "Low Heat Input" welding process has been brought to the arc welding of cast iron.



\$20,000 SAVED! When this \$20,000 cast iron condenser crashed to the ground, the manufacturer expected to replace it completely or at best to stand an expensive and lengthy repair job. But, with Xyron 2-25 the entire repair was successfully completed in less than 100 hours. The repair was found to be entirely free of cracks and "leakers" and was accomplished without warping or embrittlement of the base metal. The weldors performing this job reported amazement with the faster, non-stop welding possible with this new Eutectic electrode.

NOW... CRACK-FREE with XYRON 2-25—Eutectic's new

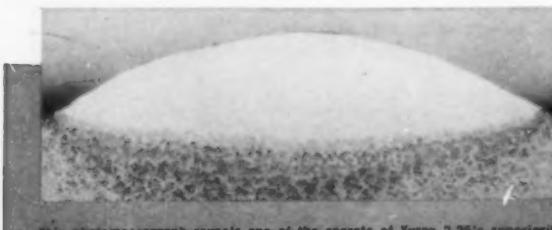


Flame Torture Test Proves XYRON 2-25 Is Non-Cracking

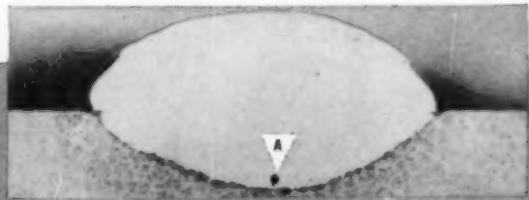
The remarkable non-cracking property of Xyron 2-25 . . . one of its most important advantages over conventional electrodes . . . is proven by this torture test. A cover bead is run on $\frac{3}{8}$ inch cast iron plate using Xyron 2-25 and a conventional cast iron electrode. The slag is cleaned and the bead shined with a wire brush. By using a neutral flame with the core near the beads (only the beads

are heated, base metal remains cold), each one is heated to a dull red color. Any hidden cracks in the weld deposit will then appear.

The conventional electrode bead shows numerous cracks (left, above). The Xyron 2-25 bead shows no cracks (right, above), proving that none are present and that Xyron 2-25 has the ability to withstand temperature changes.



This photomicrograph reveals one of the secrets of Xyron 2-25's superiority over the usual nickel electrodes. Notice the shallow uniform penetration. The smooth tapered shoulders of this deposit minimize stress formations and aid slag removal, eliminate cracks and "leakers." The extreme fluidity and wetting action of Xyron 2-25 eliminates the need for a lot of electrode manipulation.



This photomicrograph of conventional nickel electrode deposit shows how built-in stresses are caused, resulting in dangerous cracking in service. This electrode gives only a deep, localized penetration with excessive build-up and lack of wash. This deposit is not even machinable at point A. Xyron 2-25 deposits are superior in machinability at every point.

Make This Comparison



TECHNICAL ADVANTAGES	CONVENTIONAL NICKEL ELECTRODES	NEW NON-CRACKING EUTECTRODE XYRON 2-25
LOW HEAT INPUT	?	YES
NON-CRACKING	?	YES
CAN BE USED "COLD"	?	YES
CAN BE WELDED "NON-STOP"	?	YES
EASY MACHINABILITY	?	YES
HIGH TENSILE STRENGTH	?	YES
VERSATILITY	?	YES
EASY SLAG REMOVAL	?	YES
PERFECT COLOR MATCH	?	YES
LEAK PROOFNESS	?	YES

CAST IRON WELDING

strontium-aluminum bearing electrode

perfect for all types of gray and ductile cast iron
including "Meehanite", "Ni-Resist" and joining cast iron to steel

Here's proof of the superiority of Eutectic's new Xyron 2-25. Just study the comparison chart above and you'll see that Xyron 2-25 gives you everything you want for faster, better welding. The case histories shown are typical of the reports by users all over the country, in extensive tests.

And, Xyron 2-25 is not just another conventional nickel alloy electrode. Its new strontium-aluminum formulation gives Xyron 2-25 higher weld quality and strength by purging the molten filler metal from harmful sulfur and sulphides, purifying it from oxide inclusions and improving the elec-

trode's fluidity. All types of cast iron alloys such as Meehanite, Ni-Resist, and others, cast iron joined to steel, even old, dirty, and oxidized surfaces can be welded without preheating when you use Xyron 2-25. Not only does Xyron 2-25 save you time, but it also minimizes or eliminates the danger of warping, stress or embrittlement of the base metals.

The crack-free feature of this new electrode makes it ideal for the newest metals in the cast iron field. There is no weldable application for cast iron for which Xyron 2-25 cannot be recommended. It is the electrode every weldor has been waiting for.



FREE - now 16 page Eutectic Weldor Magazine. See how one plant increased production joining 500%... read actual case histories of time and money savings on maintenance and repair... learn the welding procedures for perfect salvage jobs not possible with conventional welding materials. Just drop the coupon in the mail TODAY for this valuable book.

SEE A DEMONSTRATION -
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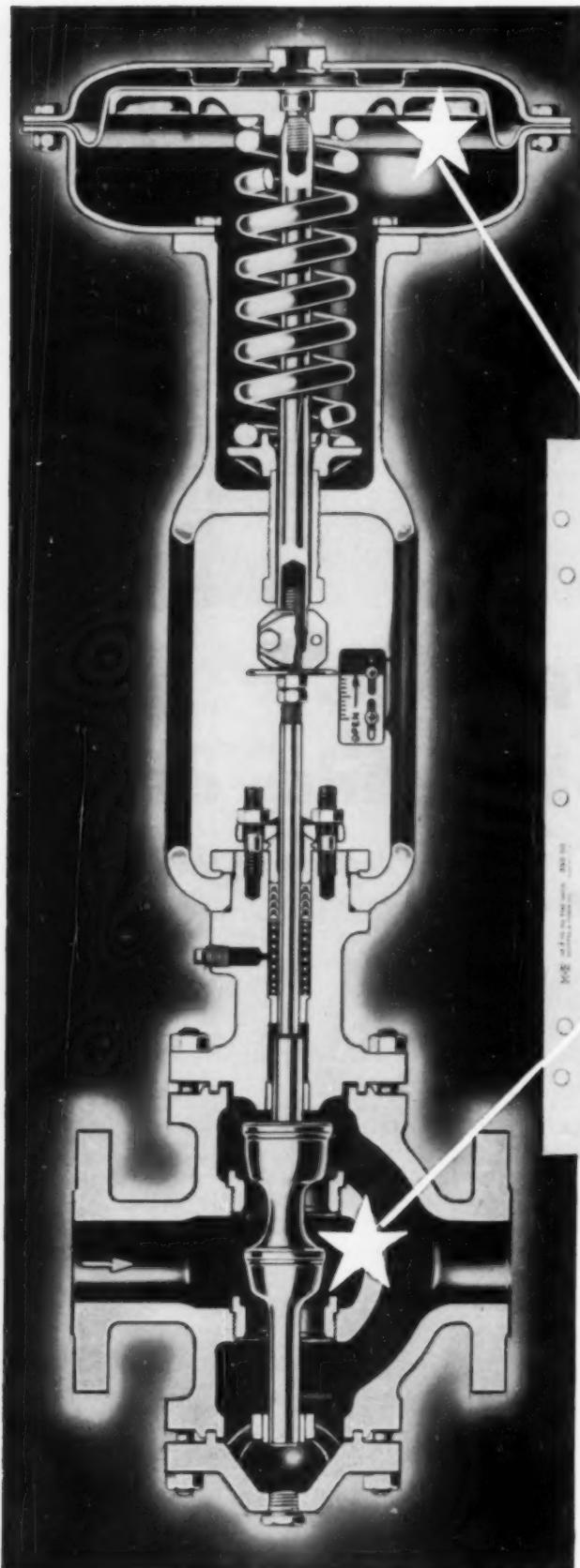
Your local Eutectic District Engineer is ready to show you, in your own shop, with your own materials, that Xyron 2-25 will out-perform any nickel cast iron electrode you may now be using. For letting him show you how Xyron 2-25 will let you make better welds at amazing savings in time and labor, he'll give you a pair of burn-resistant welding goggles with unbreakable frames and lenses. They're perfect for torch welding -- and they're yours FREE -- just for seeing a demonstration. Supplies are limited so make an appointment today with your local Eutectic District Engineer, or, use the coupon.



EUTECTIC WELDING ALLOYS CORP.
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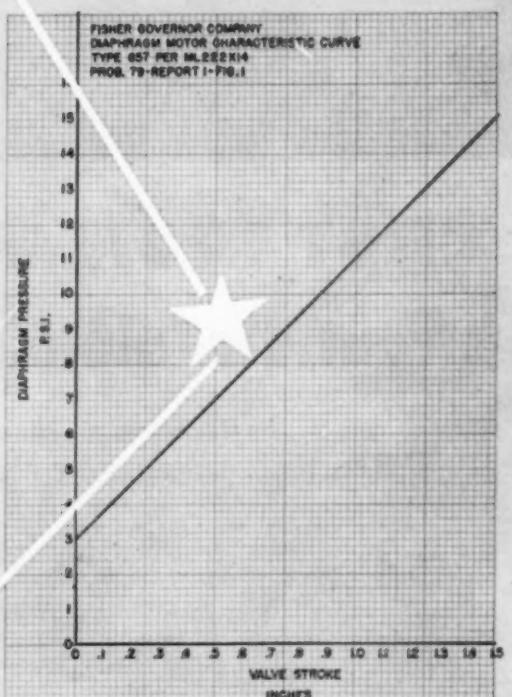
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Improved Design
**DIAPHRAGM
MOTOR VALVES**



Actual photo of test curve.

**NEW SUPER STRUCTURE
PROVIDES LINEARITY OF OPERATION**

Special molded diaphragm, in combination with deep casing, provides constant diaphragm effective area. Resultant linear relationship between input signal and inner valve position makes flow versus diaphragm pressure characteristic of control valve identical to flow versus lift characteristic.

**FISHER GOVERNOR
COMPANY**
MARSHALLTOWN, IOWA
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THREE NEW MODELS

expand  steam turbine line

The latest in a long series of advancements in the Dean Hill line of horizontal steam turbines is the addition of three new turbines introduced as intermediate models. These new models effect a more gradual increase in power ratings in the horizontal line. The reduced "spread" between ratings in the new 8-model line gives you a better opportunity to match the turbine to the job within a very close margin. Of course, this is always to your advantage in turbine selection.

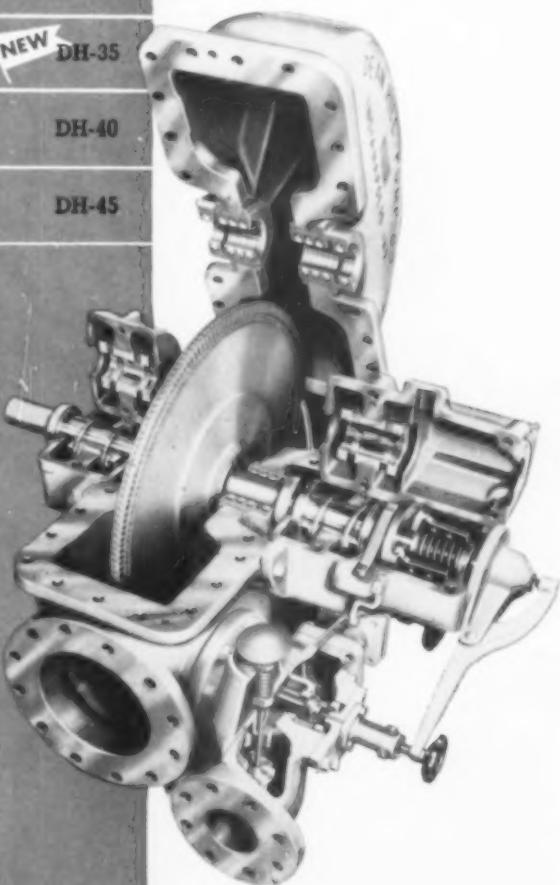
Because the new models incorporate all the newest improvements made on the other sizes, the Dean Hill horizontal line is one of the most advanced, complete lines in the world. With single-stage construction and sleeve bearings, they are specifically designed to operate at medium steam pressures. Low power consumption results in outstanding operational economy of every model in the line.

Write for Catalog No. 500 for details on both vertical and horizontal DH turbines. Information includes cut-a-way illustrations, detailed line drawings, tables, horsepower curves.



DH-10
NEW DH-15
DH-20
NEW DH-25
DH-30
NEW DH-35
DH-40
DH-45

NOW YOU CAN CHOOSE
FROM 8 MODELS TO
MEET YOUR WORKING
REQUIREMENTS



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Pump and Turbine Engineers Since 1893
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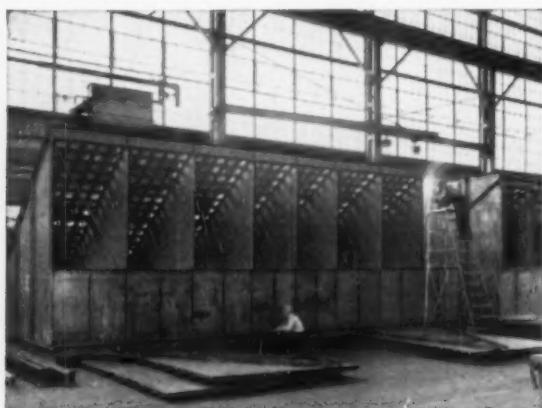
American Blower

*reports on progress
in power*



Gorgas Steam Plant No. 2, with 428,000 hp capacity, is on the Warrior River. Plant No. 3 (right), under construction, will house

Alabama Power ups capacity to



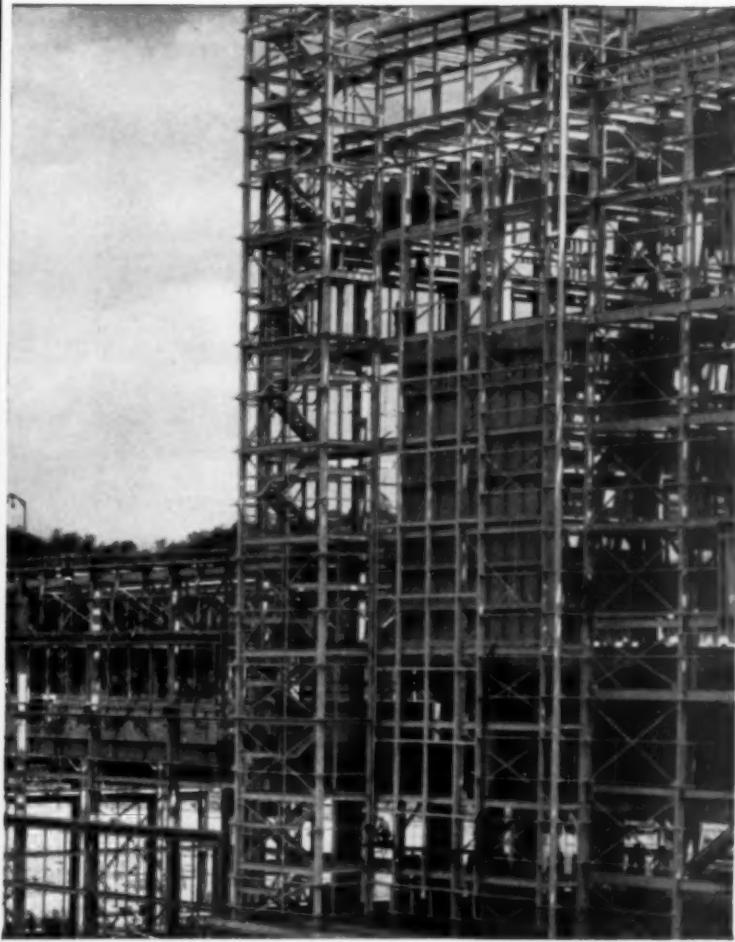
While Gorgas Steam Plant No. 3 is being built, American Blower constructs two Fly Ash Precipitators which will be installed in this new plant. Ratings: 340,000 cfm @ 285° F.

As in the past, Alabama Power installs American Blower equipment—in building for the future

WITH six steam and six hydroelectric plants, the Alabama Power Company forges ahead for the future of Alabama. In 1955 alone, it will invest more than \$35,000,000 in bigger and better electrical facilities, including an eighth generating unit at their Gorgas Steam Plants. When completed this year, Alabama Power's capacity will be over 2,000,000 hp!

American Blower Forced and Induced Draft Fans, Fly Ash Precipitators and Gyrol Fluid Drives are being installed in this new plant.

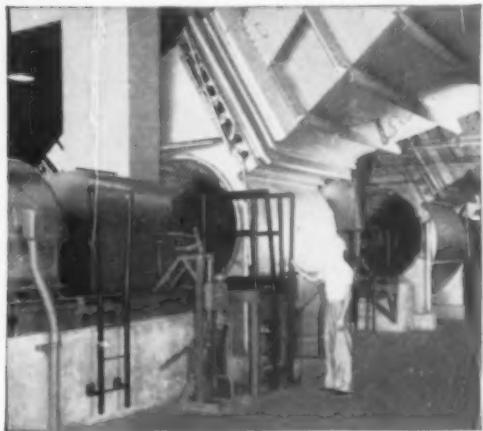
From coast to coast you'll find American Blower playing an important role in the expansion and modernization of many other progressive, investor-



No. 8 generating unit, rated at 208,000 hp.



Gorgas Unit No. 7 uses American Blower Fans with Gyrol Fluid Drives. Induced Draft Fans (above) are rated @ 262,500 cfm @ 270° F @ 15.25" sp @ 569 rpm.



American Blower Forced Draft Fans on Unit No. 7 at Alabama Power's Gorgas Steam Plant are capable of 180,000 cfm @ 140° F @ 11.00" sp @ 868 rpm.

over 2,000,000 hp!

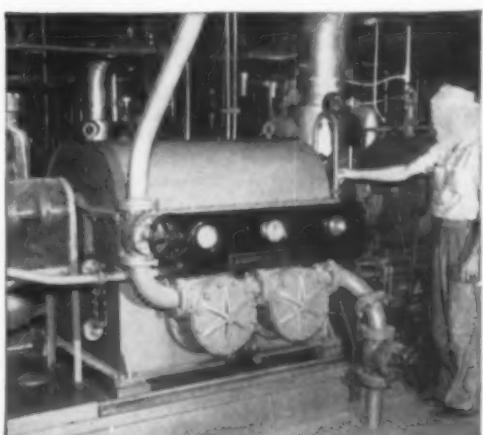
owned utilities. Plant operators have come to rely on American Blower Heavy-Duty Steam Coils and Fly Ash Precipitators, as well as our Mechanical Draft Fans, Dust Collectors, and Gyrol Fluid Drives for boiler-feed pump and fan control.

Give us a call to discuss your program. An experienced representative will gladly go over your requirements, and recommend equipment of the highest efficiency and economy. Contact your American Blower or Canadian Sirocco Branch Office.

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In addition to fan control, American Blower Gyrol Fluid Drives — class VI, 1500 hp — are used for adjustable speed control of boiler-feed pumps.

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(c47)



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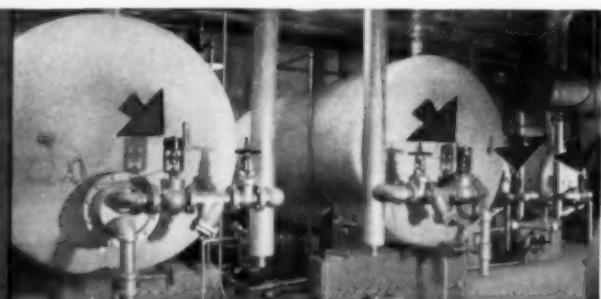


5 of the 8 Powers Controlled

Water Heaters

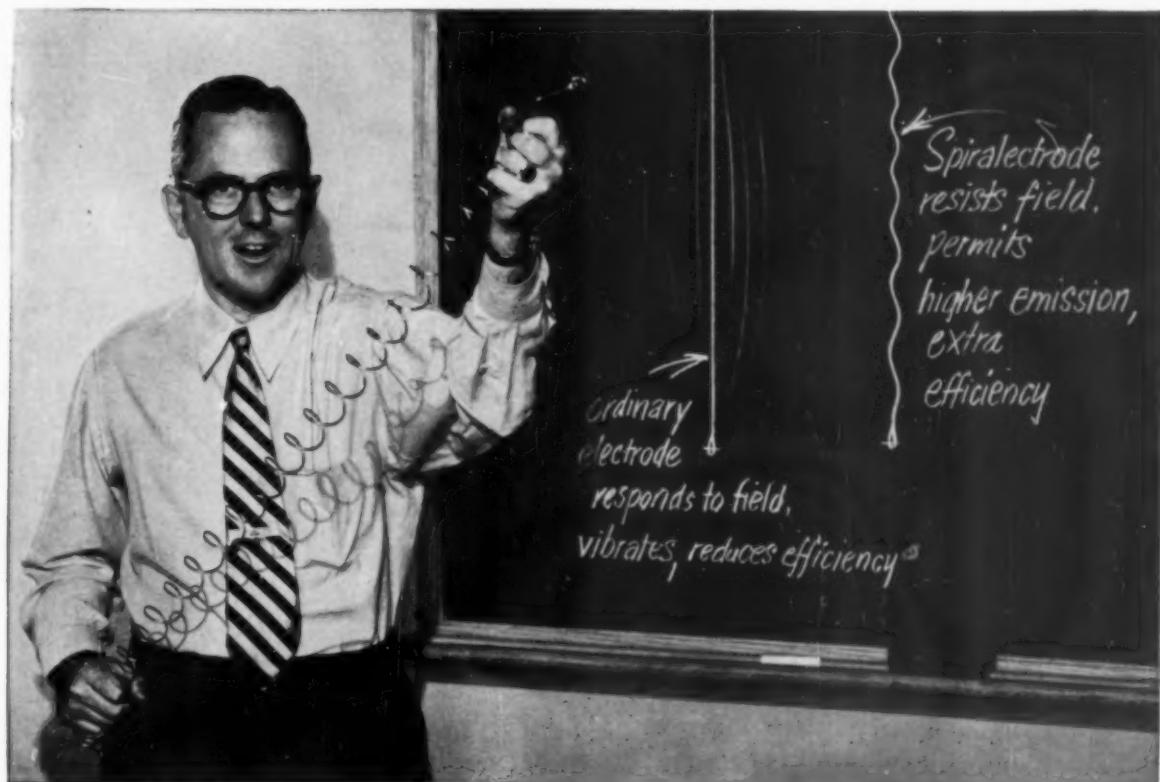
Heat Exchanger, left, supplies properly tempered water to swimming pool.

Water Storage Heaters, right, are also controlled by Powers No. 11 Self-Operating Temperature Regulators.



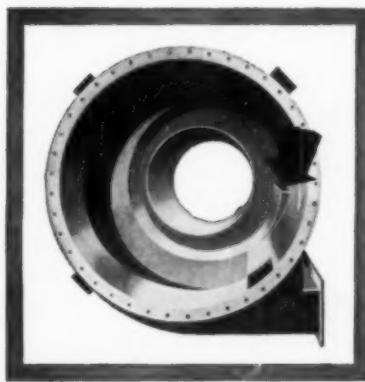
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TIMELY COMMENTS

SOUTHERN POWER
AND INDUSTRY

Technology and the Liberal Arts

AMERICAN COLLEGES and universities of the future must produce leaders capable of reconciling the classic patterns of the liberal arts with the advantages of modern technology, Henry du Pont, a vice-president of the Du Pont Company, said in Miami, Florida, recently.

Advancing technology has led to sweeping social and cultural changes in the universities, with the prospect of virtually all Americans eventually earning college degrees, he said in addressing the 24th Annual Conference of Academic Deans of the Southern States.

"The liberal arts are on the threshold of their most useful period of expression, for our need today is for education in the broadest sense. Society demands that universities supply not only the technical experts but those with a potential for broad leadership."

With our highly complex society of today, more specialization is needed. "Yet the greater degree of specialization we achieve, the greater the need for a perspective that can balance and equate the diverse elements in terms of the broader purpose."

The technical student must recognize and understand the social forces just as he must understand the stresses of physical phenomena, "otherwise his capacity for leadership will be severely limited."

At the same time, the liberal arts courses "must include a thorough analysis of the impact and the meaning of technology. . . . Failure to understand the nature of technology is the basis of many of our present national and international tensions," he explained.

"The danger is that we tend to look at life not as through a window, but as through a mirror. And we are likely to see only the image of ourselves rather than the clear and undistorted truths that lie just beyond . . .

"The role of leadership in tomorrow's world will be assumed neither by those who know a great deal about a very little or a very little

about a great deal. It will be discharged only by those whose thinking is broad and uninhibited, those with grasp and understanding," he said.

Thus industry is dependent on the universities as the universities are dependent on industry. "Each prospers in proportion to the health of the economic order, and each has an enormous stake in the well-being of the other."

Each has been able to do something no other system has ever done in world history, he added, "it has brought its product, whether it be a diploma or a deep freeze, within the reach of practically every family."

Two Big Changes

The impact of expanding technology has brought about two great revolutions in the field of education in the last half century, he said. The first was "the transformation of the American college from a liberal arts sanctuary to one in which technical training in engineering and the physical sciences have come to have so important a place."

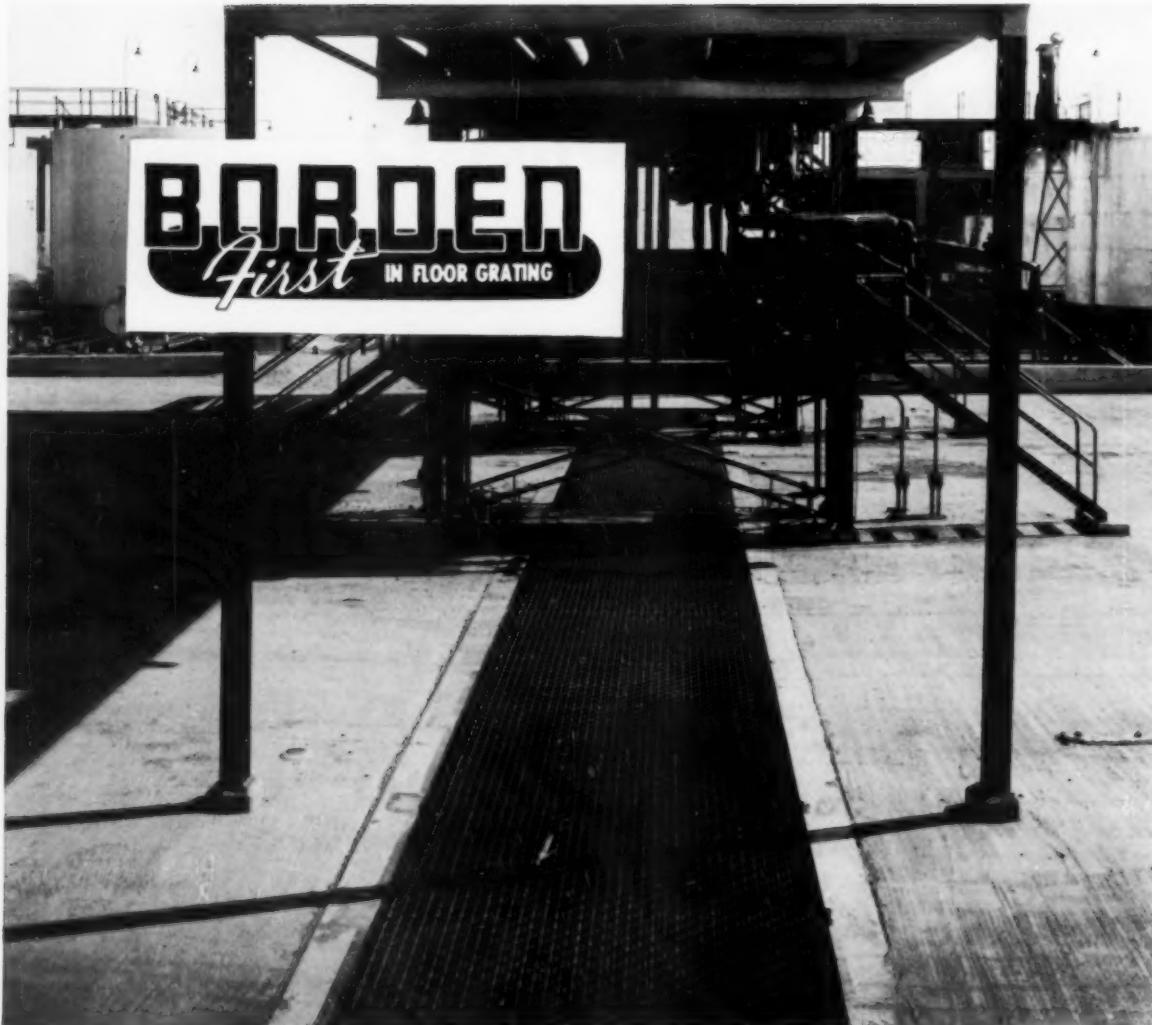
The second was the greatly enlarged percentage of the population attending college. "In 1900, about one boy in 30 went to college. Today, it is one boy or girl out of three, and the probabilities are that this ratio will increase. We are undergoing the greatest mass educational program in history and on a scale which, by standards set in other parts of the world, is fantastic."

Sources of Financial Help

Greatly increased enrollments and rising costs create a financial problem for the universities for which there is no easy solution, but for which there are three sources of relief which should be considered, Mr. du Pont said.

Industry has recognized the need and is now contributing about \$100,000,000 a year. He predicted this will be increased and probably dou-

(Continued on page 76)



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INDUSTRY SPEAKS



It's Time to Take a NEW LOOK

Products . . Markets . . Production . . Distribution

WHILE IN ATLANTA recently for one of a series of conferences with General Electric officials in key Southeastern cities, **Philip D. Reed**, Chairman of the Board of the **General Electric Company**, said that while it has become fashionable in the past ten years to speak of "our high standard of living," it's time for business leaders to take a "new, daring look at the whole process of creating new products, developing new markets and getting the goods built, sold and delivered."

"We think we have an efficient economic system, but I am convinced that we are only beginning to understand the true potentials of scientific management in a free industrial society."

The G-E Board Chairman said the electrical industry, which is growing twice as fast as the economy as a whole and is expected to double its production in the next ten years, is the key to raising our standard of living to new heights.

"There are no limits to the aspirations and desires of the human race, and there is practically no limit to all that could be invented, produced and sold to make life more satisfying and productive."

Mr. Reed also made the following comments on other subjects relating to the future of the national economy:

Research and Development — American prosperity and growth are based on innovation: the endless development of new products, new markets, new methods of making and distributing goods. The bill for research in the United States is now \$4 billion a year. In 1941 it was less than \$1 billion.

Atomic Energy — We have some years to go

before nuclear plants will become generally competitive with plants fueled by coal, gas and oil. By 1965 only a small percentage of new power plants being added to utility systems will be nuclear-fueled. By 1975, perhaps one-half of the new generating equipment being installed will be nuclear.

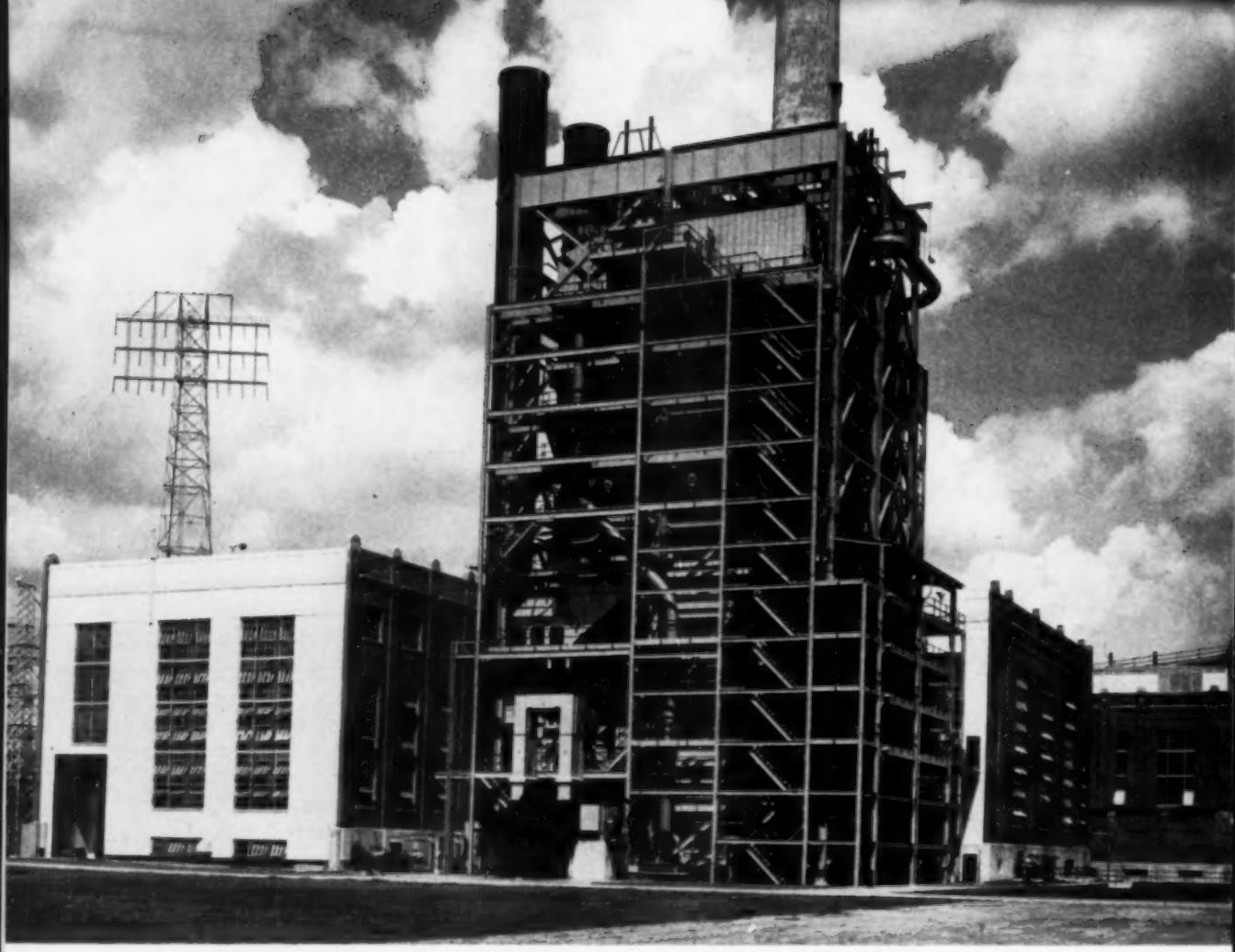
Automation — Automation is another phase — an important one — in the process of raising our level of living. We are a long way from automatic factories and automatic offices. The real question is whether industry will be able to automate fast enough to keep up with the demands of the growing American market.

Capital Expenditures — According to best estimates, America must invest the tremendous sum of \$420 billion in its productive machine in the next 10 years — \$205 billion to replace its fixed assets and \$215 billion to finance its present rate of expansion.

An increasing share of this investment needs to come from greater numbers of people using their savings to buy shares in industry. The factors are not all economic. The greater understanding of our business and economic system which results from shareowner participation is needed as much as the investment.

Manpower Development — All of our plans and opportunities for creating a much higher standard of living — through scientific research, atomic energy, automation, and other modern wonders — may be jeopardized by a lack of adequately-trained manpower.

To reach our goals, we need men of ever-increasing education, creativity and competition. Industry and the nation's educational system must work together more closely to supply the need for qualified men.



General view looking northwest showing No. 9 boiler and the turbine room extension.

Houston Lighting & Power Combines New With Old **DEEPWATER EXTENSION - 165,000 KW**

THE DEEPWATER Station of the Houston Lighting and Power Company is located on a 94 acre site approximately 10 miles southeast of downtown Houston fronting 1340 ft on the Houston ship channel.

In 1952, Houston Lighting & Power Company contemplated a 125,000 kw unit extension to this station. However, subsequent load studies indicated that a 165,000 kw installation would be more desirable since this same size unit

By A. P. PRIDDY
Mechanical Project Engineer
Ebasco Services, Inc.

and in general the same design could be used for future extensions to this Company's system. Such future duplication would then effect considerable economies in both engineering and construction.

The Deepwater station, over the

quarter century from 1924 through 1949, was the major generating station of the Houston Lighting and Power Company system. The initial installation in 1923 comprised two 20,000 kw units. Subsequent extensions of 25,000 kw, 35,000 kw and 47,000 kw were made in 1926, 1928 and 1929 respectively, the last one involving a high-pressure topping unit with steam reheat superposed on the 350 psig station.

The 165,000 kw extension, called

Unit No. 7 and boiler No. 9, was placed in operation in June, 1955. The station now has an approximate developed capacity of 315,000 kw. When required, a second 165,000 kw unit extension readily could be added south of Unit No. 7.

Prior to the 1955 extension, Deepwater was a conventional indoor type station. However, for the 1955 extension, studies indicated that the economic and preferable arrangement would be obtained with a semi-outdoor design wherein the turbine generator unit would be indoors while the steam generating unit would be placed outdoors.

Providing connections to the existing plant at appropriate levels effectively retained existing operating levels and permitted the use of the existing station crane for this extension. By placing the steam generating unit outdoors, a large part of the enclosure costs that would have been required on the boiler were saved.

From an operational standpoint the outdoor type boiler installation presents no difficulties since most operations, except for routine inspections of the boiler, are controlled from boards located within the existing building.

The plant site is served by the Houston Belt and Terminal Railroad. One main railroad spur enters the south end of the plant. Within the station property, spurs serve the turbine room and transformer area.

165,000 kw, 1800 pound extension is installed in-line with five older units. New 1,200,000 pound steam generator is semi-outdoor type.

The turbine room extension rests on a concrete mat supported by approximately 1000 timber piles each having a minimum bearing capacity of 25 tons. The existing circulating water system was extended to provide circulating water for the new unit. The boiler foundation, which is at grade elevation 23.00', is supported by individual column foundations resting on 50-ton concrete piles.

In the turbine room, the original

basement elevation 3.00' was kept but the extension operating floor was raised to elevation 33.50'. Connection between this operating floor and existing turbine room operating floor of elevation 32.00' was made by means of ramps.

The turbine room superstructure is of structural steel with a brick facing matching the existing architectural arrangements. This structure carries the existing 75-ton main crane but is so designed that it will support a future 110-ton crane. The south end wall of the extended turbine room is of the knock-out type to permit future extension in this direction.

The new No. 9 boiler firing aisle lines up with the existing boiler house firing aisles. Its first walkway columns are 26' south of the existing building columns. Cross-over walkways between boilers 8 and 9 are provided at elevation 49.00' to the lowest firing aisle of boiler 9 and at elevation 88.25' where the tie is made from boiler 9 platform elevation 93.52' to the fan room on the roof of the No. 8 boiler house.

In the southwest corner of the turbine room extension, a steel rolling door is provided at grade to permit entrance into the turbine room by truck or railroad car on the west side of the turbine pedestal.

Turbine Generator

One General Electric 125,000/156,250 kw, 3,600 rpm, tandem

compound double flow (bottom exhaust), 1800 psig, 1000 F throttle with reheat to 1000 F turbine generator is installed with its long axis parallel to the turbine room crane rails. The unit is designed for operation at 3.5" Hg. 3% evaporated make-up using six extraction points for feedwater heating. The high-pressure turbine exhaust (6th stage) which returns its steam to the boiler reheat also provides the extraction steam for

the highest pressure heater. The remaining five extraction stages are taken from the intermediate and low-pressure portions of the turbine and are respectively the 9, 11, 13, 15 and 17th stages.

The generator is rated at 176,470 kva at 0.5 psig hydrogen pressure, 0.85 pf, 20,000 v, 3 phs, 60 cy. The unit is equipped with a direct connected exciter and amplidyne voltage regulation.

A conventional main oil reservoir complete with main auxiliary oil pumps handles the lubricating and governor oil requirements. A Bowser turbine oil conditioner with a circulating capacity of 18 gpm provides for continuous bypass oil purification. This associated equipment is located on the basement floor elevation 3.00' at the steam end of the machine.

Condensing Plant

Turbine exhaust flow is condensed by a single 100,000 sq ft, two-pass divided water box Ingersoll-Rand Company condenser. The condenser hot well bottom rests on the basement floor, elevation 3.00', and its connection to the turbine exhaust is through a stainless steel expansion joint. Provision is made for removal of this joint for examination and repair if such becomes necessary. Air removal is by means of a steam jet air ejector with inter and after condensers complete with two primary and two secondary steam jets. In addition, a single hogging ejector is included. For protection of the steam jet air ejector, condensate recirculation is used with a flow nozzle and meter with contacts actuating a recirculating valve.

There are two vertical mixed-flow circulating water pumps having salt water trim and removable elements designed for 43,000 gpm at 33.7' TDH. There are three 50% capacity vertical condensate pumps each having seven stages and designed for 1100 gpm flow at 550' TDH.

Steam Generator

The steam generator, manufactured by the Riley Stoker Corporation, has a rated continuous capacity of 1,200,000 lb/hr using natu-

ral gas fuel. The unit is front fired with a radiant furnace and integral reheater. Superheater outlet conditions are 1935 psig and 1005 F. Matching design reheater outlet conditions are 491 psig and 1005 F.

The water cooled furnace provides 81,750 cu ft of furnace volume. The high temperature superheater and reheater are located in the furnace exit. From this point, the rear pass of the boiler is divided into three parallel sections containing the low temperature superheater surface, low temperature reheater surface and the economizer by-pass section. Total superheater surface is 75,200 sq ft. Total reheater surface is 49,850 sq ft. Dampers at the exit of these three passes provide for the temperature control of superheat and reheat steam. The control range is from 900,000 to 1,200,000 lb/hr based on primary superheater flow (with matching reheater flows).

Twenty-four Peabody type H26 combination gas ring and mechanical atomizing oil burners are arranged for front firing in four vertical rows of six burners each. A gas electric igniter with local control only is furnished for each burner.

The firing aisles are open except for a canopy which is provided over the highest row of burners.

Two vertical Ljungstrom air heaters with a total surface of 99,200 sq ft are provided. These are cross-connected with the two forced draft fans to provide for operation of either or both fans with either or both air heaters. Auxiliary air drives are provided with automatic back-up for the motor rotor-drivers on the air pre-heaters.

Two Green Fuel forced draft fans are located, one on each side of the boiler. Each has a capacity of 203,000 cfm at 100 F and static pressure of 27.7 inches of water. Regulation is by means of inlet dampers on the inlet boxes. A hot air recirculation system serves to raise the exit gas temperature when conditions warrant in order to prevent corrosion of the air preheater elements. Flue gas is discharged through two unlined steel stacks supported on the rear of the boiler steel and extending 25' above the top of the main boiler steel.

Oil is basically a stand-by fuel. However, provisions have been made for future addition of soot

blowers and necessary platforms in the event of extensive oil firing or conversion to solid fuel firing. The boiler is designed to permit conversion to solid fuel firing if desired.

A diamond multi-port water gage is located at each end of the boiler drum. The south side gage is for direct reading at drum elevation while vision ducts bring the image of the north side gage to the lowest firing platform elevation. This drum level indication is also visible by means of a sight glass to the operators at the boiler gage board in the existing building.

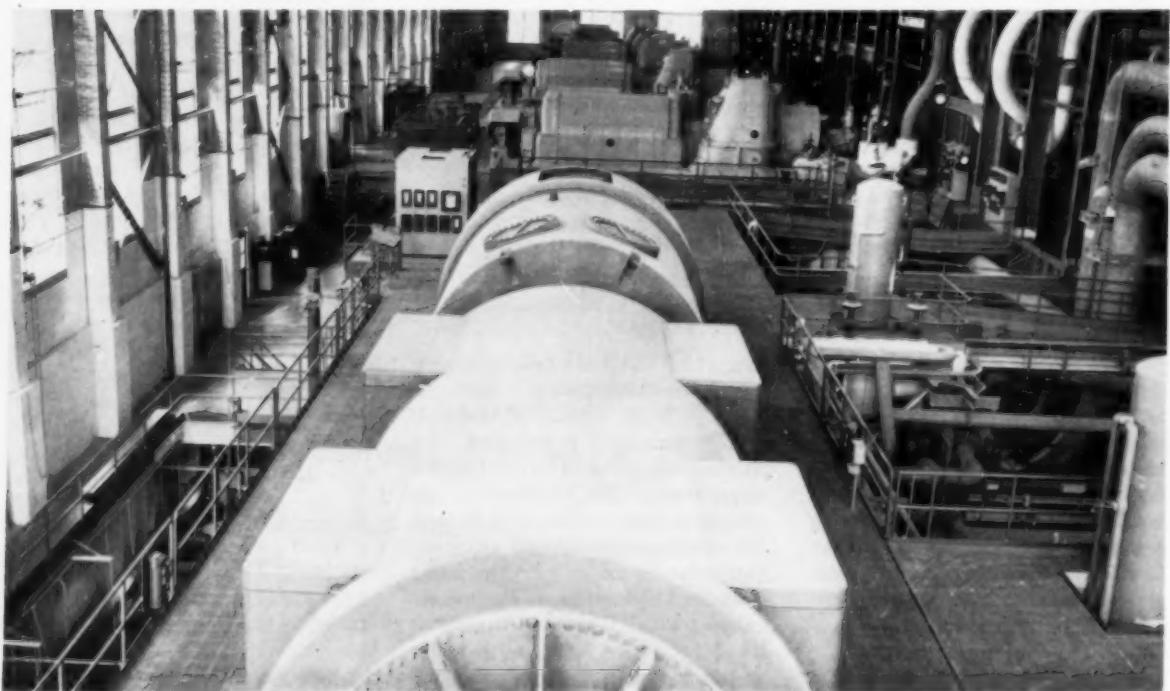
All auxiliary equipment is designed for outdoor operation.

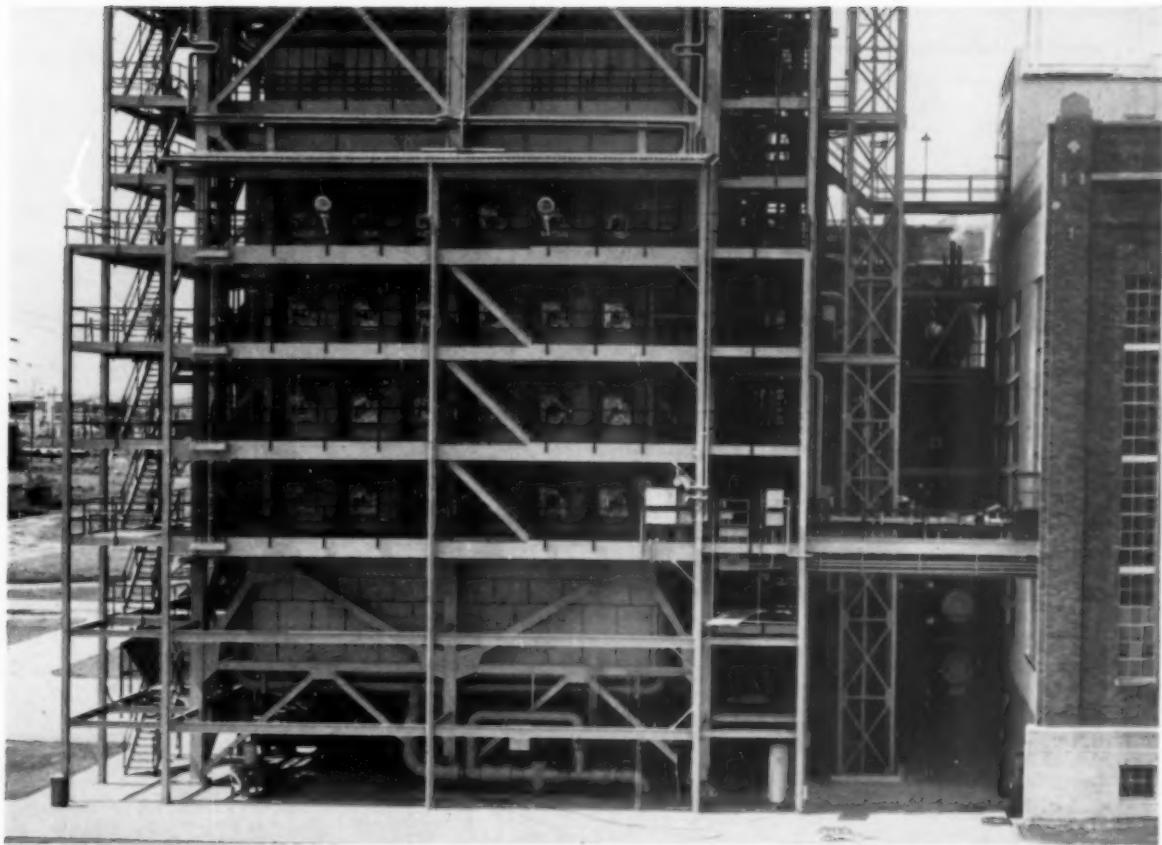
Feedwater System

The steam generator is fed by three Allis-Chalmers 50% capacity horizontal 9 stage barrel type boiler feed pumps, each capable of pumping 1480 gpm against a 5400' TDH. Each pump is equipped with a solenoid operated automatic bypass valve for low flow recirculation to the deaerator. The motor drivers are Elliott 2500 hp, 3600 rpm, 2300 v, 3 ph, 60 cy.

A Bailey three-element feed-

General view inside the turbine room with the 165,000 kw No. 7 unit in the foreground. Units 1 to 6 are shown in the background.





View looking west showing the front of boiler No. 9 and the deaerating heater, the deaerating storage tank and the two high pressure heaters. Also note the crossover connections to the existing boiler room.

water regulator is used. The regulator station is located outdoors adjacent to the high-pressure heaters and is equipped with a full capacity motor-operated by-pass valve and an air-operated vernier by-pass valve for starting and extreme low flow operations.

Blowdown System

A horizontal flash pipe or tank is located underneath the furnace section of the boiler to receive the boiler blowdown and deaerator overflow lines. It is equipped with a large vent supported on boiler steel and extending to the top of the unit while the drain line is carried underneath the boiler paving area for disposal into nearby Vince's Bayou.

Equipment Arrangement

The turbine has six extraction points at the 6, 9, 11, 13, 15 and 17th stage.

The 7th and 9th stage extraction points connect into the cross-

over and HIP heater respectively. The two horizontal high-pressure heaters are located in the corner formed by the turbine room extension and existing boiler house. The crossover heater is at grade level and the HIP heater is vertically above it. Straddling this heater arrangement, is a steel structure which ties into the wall steel and supports the outdoor deaerator. This deaerator takes steam from the 11th stage extraction point. A platform arrangement serves the deaerator, the two heaters and the feedwater regulator station, and entrance into the existing building is provided. The deaerator, using the third turbine extraction point or 11th stage, is mounted directly above this equipment.

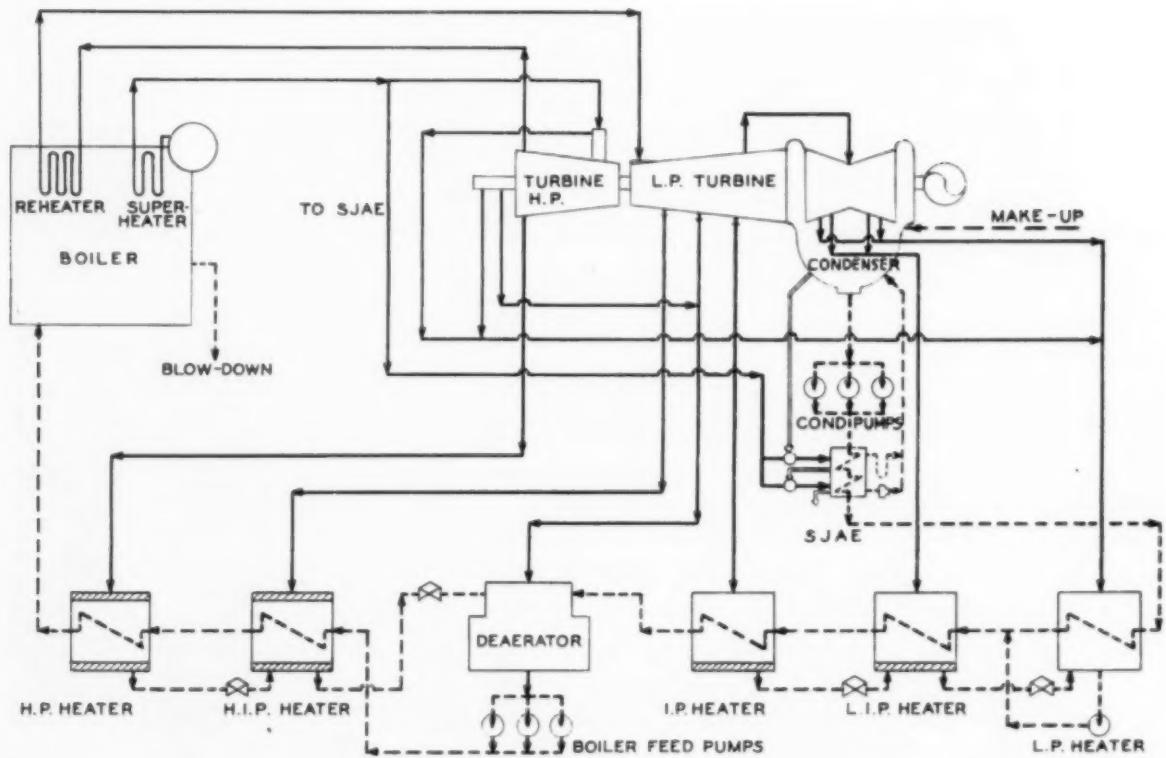
The low-pressure heaters called the IP, LIP, and LP heaters take steam from the 13th, 15th and 17th stage respectively. They are located in the turbine room, east of the pedestal and are mounted in a vertical position with the head

down. Structural steel members, mounted on the basement floor, support these heaters. With this arrangement, the flow paths for the condensate, extraction steam and cascaded drains are most direct.

The boiler feed pumps are located in the basement northeast of the turbine. Adequate suction head is provided by the deaerator which is at elevation of 54.53'.

Other Services

Make-up water for plant purposes is obtained from wells and the cooling for the new unit ties into the existing plant cooling system. Additional cooling water pumps were installed to expand these facilities. For operating convenience, these were located in the existing plant. The cooling water system mainly serves the turbine oil coolers and the generator hydrogen coolers which are connected in parallel. This cooling water is returned to an existing



Cycle diagram of new 165,000 kw extension, Houston Lighting & Power Company, Deepwater Station.

spray pond. For boiler make-up for the new unit, condensate is diverted from the older section of the plant.

The existing station air system was extended to provide for the service air required by the new unit. Instrument air is supplied by two carbon ring water cooled compressors having a capacity of 114 cfm at 100 psig. The system is complete with controls, after cool-

er, receiver, filter and reducing stations. An automatic dual chamber air dryer using sovabead as a desiccant is installed in the system. Interconnection with existing station air can be made for emergency back-up.

The control system of the new extension was set up to fit in with the operating routines established for the previous units. Accordingly, the turbine gage board, com-

plete with all operating and supervisory instruments, was located at the turbine end of the new unit. The boiler gage board was located in essentially the same relative position as the existing boiler gage boards by setting it in the southeast corner of the present boiler house at elevation 32.00'.

The existing electrical switchboard or control room was ample to accommodate the new electrical

PRINCIPAL EQUIPMENT

Deepwater Extension – Houston Lighting & Power Company

TURBINE GENERATOR

Turbine Generator One—General Electric Company, 125,000/156,000 kw, 3600 rpm, tandem compound double flow (bottom exhaust), 1800 psig, 1000 F, reheat to 1000 F, with 3½ in. Hg exhaust pressure, 3 per cent evaporation make-up and 6 extraction points for feedwater heating. Turbine is directly connected to a hydrogen cooled generator rated at 150,000 kw, 176,470 kva at 0.5 psig hydrogen pressure, 20,000 volt, 3 phase, 60 cycles.

Main Exciter One—General Electric Company, 550 kw, 800 rpm, 375 volt, gear-connected to the generator.

CONDENSING EQUIPMENT

Condenser One—Ingersoll Rand Company, 100,000 sq ft, horizontal, 2-pass, divided water box type. **Circulating Water Pumps** Two—Ingersoll Rand Company, vertical mixed flow 43,500 gpm 34 ft TDH, with Elliott Motor Company 500 hp, 514 rpm, 2300 volt motor drives.

Condensate Pumps Three—Ingersoll Rand Company, 550,000 lbs/hr, vertical tank turbine type, 7 stage, 550 ft. TDH with Elliott Motor Company 250 hp, 1800 rpm, 440 volt motor drives.

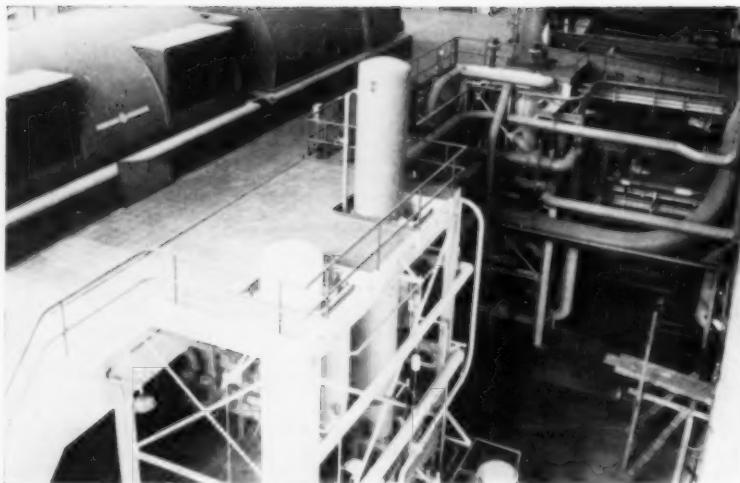
Air Removal Equipment One—Ingersoll Rand Company, twin-element, 2 stage steam jet air ejector with two primary and two secondary jets, inter and after condensers. An 8 in. single stage non-condensing priming ejector is included for supplementary operation.

STEAM GENERATING EQUIPMENT

Boiler One—Riley Stoker Corporation, 1,200,000 lb/hr at 1935 psig and 1065 F total temperature, single drum, direct fired, pressurized casing, radiant type.

Superheaters One—Riley Stoker Corporation (Grinnell Company), 2 stage, 75,200 sq ft low temperature section and high temperature section interconnected with headers, temperature control range 900,000 to 1,200,000 lb/hr.

Reheaters	One—Riley Stoker Corporation (Grinnell Company), 2 stage, 49,850 sq ft, temperature control range 805,000 to 1,063,000 lb/hr.
Furnace	One—Riley Stoker Corporation, water cooled, roof tubes, water wall surface, pressurized casing with 81,750 cubic feet of furnace volume.
Air Heaters	Two—Air Preheater Corporation, vertical Ljungstrom type, 99,200 sq ft (49,600 sq ft each), inlet air temperature 100 F, outlet air temperature 575 F at 1,200,000 lb/hr steam flow. The air heaters are driven by two General Electric Company, 7½ hp 1800 rpm motors.
Economizers	One—Riley Stoker Corporation (Grinnell Company), continuous looped tube type, 17,350 sq ft surface.
Burners	Twenty-four — Peabody Engineering Company, for burning natural gas and fuel oil, ring and mechanical atomizing type burners, automatic operation.
Soot Blowers	Not installed at present, but Diamond type wall box is provided for future installation of soot blowers.
Safety Valves	Manning, Maxwell & Moore (Consolidated), 1—Superheater Header, 4—Steam Drums, 5—Reheater Header.
Electromatic Relief Valve	Manning, Maxwell & Moore (Consolidated), 1—Superheater Header.
Blow-off Header	One—Benjamin F. Shaw Company, 3 ft OD.
Combustion Controls	One—Bailey Meter Company, pneumatic type.
Superheat & Reheat Control	One—Bailey Meter Company, pneumatic type.
Automatic Ignition System	Peabody Engineering Company.
DRAFT EQUIPMENT	
Stacks	Two—Mosher Steel Company, steel type.
Breeching & Air Ducts	Lang Company.
Forced Draft Fans	Two—Green Fuel Economizer Company, 202,000 cfm at 100 F and 27.7 in. water S.P. with Elliott Motor Company, 1000 hp, 900 rpm, 2300 volt motor drives.
Fan Couplings	Two—Fast Company, flexible couplings.
BOILER FEEDWATER EQUIPMENT	
Boiler Feed Pumps	Three—Allis-Chalmers Mfg Co., 9 stage barrel type, 1480 gpm at 250 F, TDH 5400 ft with external lube oil cooling system Kingsbury thrust bearings and Elliott Motor Company 2500 hp, 3600 rpm, 2300 volt motor drives.
Closed Heaters	Five—Griscom Russell Company:
	1. High pressure heater — horizontal U-tube, two-pass with internal desuperheating section and drain cooler. Surfaces: desuperheating—402 sq ft, condensing—3318 sq ft, cooling—640 sq ft.
	2. High pressure intermediate heater — horizontal U-tube, two-pass with internal desuperheating section and drain cooler. Surfaces: desuperheating—206 sq ft, condensing—1872 sq ft, cooling—334 sq ft.
	3. Intermediate pressure heater—vertical, U-tube, two-pass with internal drain cooler. Surfaces: condensing—2990 sq ft, cooling—180 sq ft.
	4. Low Intermediate pressure heater—vertical, U-tube, two-pass with internal drain cooler. Surfaces: condensing—3321 sq ft, cooling—314 sq ft.
	5. Low pressure heater—vertical, U-tube, four-pass, 3298 sq ft surface.
Deaerating Heater	One—Worthington Corporation, direct contact, vent condensing, tray type, 1,300,000 lb/hr capacity connected to a 150,000 pound storage tank.
Low P. Heater Drip Pump	One—Worthington Corporation, 11 stage, vertical can type, 410 gpm at 190 F and TDH of 509 ft.
Heater Drain Controls	Black Sivals & Bryson Company (Climax), diaphragm air operating through torque tube float chambers.
Feedwater Controls	Bailey Meter Company, pneumatic, 3 element.
FUEL HANDLING (Gas and Oil)	
Gas Control Valve	Bailey Meter Company, 10 in.
Gas Shut-Off Valve	Rockwell Mfg Company (Nordstrom).
Fuel Oil Pumps	Two—Sier Bath, internal gear and bearing type screw pumps, 150 gpm of No. 6 bunker C fuel oil (40,000 SSU at 70 F) at 250 psi TDH.
Fuel Oil Heaters	Two—Griscom Russell Company, horizontal oil in tube, 6-pass straight tubes type, 2258 sq ft surface.
PIPING AND VALVES	
Piping Contractor	Benjamin F Shaw Company.
Primary Steam Piping	14 in. OD chrome-molybdenum forged and bored, 10.75 in. OD chrome-molybdenum roll seamless.
HIGH TEMP. REHEAT PIPING	
	24 and 16 in. OD chrome-molybdenum welded plate type piping.
High P. Large Gate Valves	William Powell Company.
High Pressure Large Size Check & Globe and Small Size Valves	Edwards Valves Inc.
Low P. Large Valves	Jenkins Brothers.
Medium P. Small Valves	Manning, Maxwell & Moore, Inc (Hancock).
Positive Closing Check Valve	Atwood & Morrill Company, reverse current, air operated.
Pipe Covering Contractor	Johns Manville Company.
INSTRUMENTS	
Control Boards (Mechanical)	Bailey Meter Company.
Control Boards (Electrical)	Westinghouse Electric Mfg Company.
Steam Flow Meters	Bailey Meter Company.
Condensate Flow Meters	Bailey Meter Company.
Feedwater Flow Meters	Bailey Meter Company.
Draft Gages	Bailey Meter Company.
Pressure Gages, Indicating	American Chain & Cable Co., Inc (Hellcold).
Pressure Gages	Manning, Maxwell & Moore Inc.
Mercury Vacuum Column	Taylor Instrument Company.
Thermometers, Indicating	Palmer Thermometers Inc.
Test Wells (S. S. & Thermo-couple Assemblies)	Trinity Equipment Corporation.
Test Wells, Brass	Palmer Thermometers Inc.
Temperature Recorders & Thermocouple Assemblies	Leeds & Northrup Co.
Conductivity Recorders	Leeds & Northrup Co.
ELECTRICAL EQUIPMENT	
Main Transformer	Three — Westinghouse Electric Mfg Company, single phase 75,000 kva for each, 19,000 volts to 69,730 volts.
Auxiliary Transformers	Two—Allis Chalmers Mfg Company, 3 phase 6000 kva, 19,450 volts to 2300 volts.
Standby Auxiliary Transformers	One—Allis Chalmers Mfg Company, 3 phase, 6000 kva, 66,000 volts to 23,000 volts.
Oil Circuit Breakers	Two—Pacific Electric Mfg Company, 69,000 volts.
Station Service Switchgear	One—ITE Circuit Breaker Co., unit substation, with two 1000 kva transformers, 2400 — 480 volts.
Power & Control Cable	Simplex Wire & Cable Company.
Main Leads	Ten inch aluminum channels and tubes (Field fabrication).
MISCELLANEOUS	
Turbine Oil Purifier	One—Bowser Inc., capacity 1080 gph, storage capacity 957 gallons, with 18 gpm circulating pump.
Auxiliary Cooling Water Pumps	Three — Worthington Corporation, horizontally split double suction type, 1500 gpm, at 210 ft TDH with Elliott Motor Company 100 hp, 1800 rpm, 440 volt motor drives.
Instrument Air Compressors	Two—Joy Manufacturing Co., 8 x 5 in., single stage double acting water cooled vertical type, capacity 114 cfm at 100 psig with Elliott Motor Company 30 hp, 1800 rpm, 440 volt motor drives.
Station Air Compressors	One—Ingersoll Rand Company, 2 stage air cooled type, capacity 230 cfm at 100 psig.
Instrument Air Dryer	One — Pittsburgh Lectrodryer Corporation, soyabean dessicant type, capacity 100 scfm of air entering at 80 psig and saturated at 105 F and the final dew point not to exceed—30 F.
Transformer Fire Protection	Rockwood Sprinkler Company.
Stainless Steel Expansion Joints & Flexible Burner Connections	Solar Aircraft Co.
Rubber Expansion Joints	U S Rubber Company.
Sump Pumps	Three—Deming:
	Two—vertical submerged type capacity 150 gpm at 60 ft TDH with Elliott Motor Company 5 hp 1750 rpm, 440 volt motor drives.
	One—vertical submerged type capacity 500 gpm at 40 ft TDH with Elliott Motor Company 7½ hp 1750 rpm, 440 volt electric drive.
MISCELLANEOUS BUILDING EQUIPMENT	
Structural Steel	Mosher Steel Company and O'Neill Steel Works Company.
Doors	Jim Lunsford Company.
Precast Roof Slabs	The George Rackle & Sons Company.
Service Elevator	Otis Elevator Company, platform lift type.
Steel Paneling (Elevator Room)	H H Robertson Company.



View of condenser pit, Unit No. 7

control board and a signal system between it and the new turbine gage board permits immediate correlation between the two control panels. This arrangement is a departure from the usual centralized control room used on most of the plants in the Houston system. However, due to the physical layout of the equipment, this was considered the most feasible and practical arrangement.

General station facilities such as storage space, toilet and locker rooms, etc. were adequate at this station and no further extension was required. The machine shop facilities were extended by the addition of a new machine shop complete with a 15-ton and a 2-ton crane for handling the larger and more complex pieces of equipment

installed in the system. The new shop will serve as central maintenance headquarters for Deepwater and the other five Houston generating stations, all of which are within a 20-mile radius of Deepwater.

Electrical Equipment

The indoor generator leads were field fabricated using two 10 in. aluminum channels per phase. These are enclosed in segregated phase transite housings. The electrical joints are bolted for this portion of the generator leads. The outdoor generator leads and main transformer delta bus were field fabricated using 10 in. OD aluminum tubing and 6 in. IPS aluminum pipe. Welding tee and plug connectors were used and the conductors were covered with micarta

tubing $\frac{1}{8}$ in. wall thickness.

The main power transformer bank consists of three (3) single phase 75,000 kva, 19 kv delta to 66 kv wye transformers. The high voltage neutral is solidly grounded but provisions are made for future ungrounded or reactor grounded operation.

The auxiliary power supply was furnished through two 6,000 kva outdoor unit substation assemblies with their 2300 volt buses provided with alternate feeds from a 6,000 kva stand-by auxiliary transformer. The 440-volt station service supply was provided through a switchgear assembly consisting of two 1,000 kva transformers located outdoors with the switchgear centrally located in the turbine room basement.

Outdoor lighting is provided with flood lights and RLM dome lighting fixtures. These are controlled from the electrical operating room and provision is made for future blackout operation. The electrical operating room is lighted with indirect hung fluorescent fixtures.

Wherever it could be accomplished economically, electrical circuits were placed underground in the outdoor areas and this same scheme was followed in the indoor turbine area. This has resulted in elimination of excessive exposed electrical conduits or other type of exposed electrical circuit construction and has left more space for other uses.

New Plants — Expansions

(Starts on page 12)

. . . full operation of **American Rock Wool Corporation's** \$325,000 plant at Corsicana, Texas, scheduled for May, '56 . . . **Petrolite Corp.** completes multi-million-dollar phenolic resin plant expansion at Kilgore, Texas . . . **McCormick Steel** adding \$100,000 expansion to Houston, Texas, facilities . . . \$6,000,000 expansion at **Goodyear** synthetic rubber plant in Houston, Texas, will increase production 50% . . . 49,200 sq ft \$1,000,000 porcelain enameling plant of **Alliance-Ware** in Kilgore, Texas, is in full operation.

Kansas and Missouri

Holiday Plastics, Inc., fabricators of fiberglass reinforced plastics has leased 84,000 sq ft space in Kansas City, Kansas, for January production . . . **Goodyear Tire and Rubber** plans \$8,000,000 expansion of Topeka, Kansas, plant . . . new \$7,000,000 **Marquette Cement Mfg. Co.** plant at Cape Girardeau, Missouri, scheduled for production in late '56 with annual capacity of 1,275,000 barrels of cement . . . The **Pittsburgh Statuary Lamp Company** will produce Durastone lamps in their new Columbia, Missouri, plant . . . **Dow Chemical** building a 100,000 sq ft factory at Riverside, Missouri, to produce Styrofoam with operation scheduled for October, '56.

Removable, Insulated Cover Aids Cleaning

A 100-TON turbo-vacuum compressor, operated in connection with an air conditioning system, accumulates deposits of dirt and scum on the inside of the tubes forming the cooling coils—gradually reducing the operating capacity and efficiency of the entire unit. When this condition exists, the covers of both the condenser and the chiller water boxes are opened, then the tubes are cleaned with a flexible brush before flushing with clear water.

The water box cover on the condenser is easily removed by aid of a chain hoist and suitable wrenches, but formerly the chiller water box cover was heavily insulated with cork held in place by screen wire and asbestos cement, plus a first priming of mastic. It usually took about three hours to remove the cork insulation and other messy materials before the studs and nuts holding the heavy water box cover could be reached for dismounting. The thickness of the insulation covering the bolts can be seen in the upper photograph.

In addition to the labor of dismantling, and then recovering the water box cover with cork insulation, there was the extra cost of new insulating materials, because the old materials could not be salvaged.

Finally we solved the messy problem by having an insulated metal cap made at a local tinshop; the cap fits snugly up against the bolts shown in photo number one, and the outside of the cap follows the contour of the permanent insulation on the chiller shell. A very neat job, as is shown by the lower photograph.

Upper photo shows the end plate after original insulation has been removed. Lower photo shows the new, removable, insulated cover.

By SAM BOYER

When the chiller requires cleaning at the end of the cooling season, the snug fitting metal cap is quickly removed, without requiring the

tedious job of first scraping mastic and cork to uncover the nuts on the studs. This innovation also saves about 8 hours labor in removing and replacing the insulation formerly used and makes further savings by eliminating the cost of new materials.



Level Checked in South Carolina Plant

X-Ray Speeds Canning Inspection

No radiation problem
is involved.

The beam is small
and well shielded

A HIGH-SPEED level checker has been in operation at Borden Foods plant at Chester, S. C., since March, 1955, with good results in evidence.

Heart of the machine is a tiny crystal of cadmium sulfide, about the size of a match head, which acts on signals from an 80,000-volt X-Ray tube.

There are two X-Ray beam elements in the unit operating at Chester. One element measures the maximum allowable height of milk in the cans; the other measures the minimum allowable height of fluid in the cans. This high-speed level checker inspects cans far faster than any previously used method and also performs the task with greater precision. Accuracy is maintained to plus-or-minus $1/64"$ of liquid level.

The X-Ray beams are set to penetrate different thicknesses of material. The crystal detector is placed at the desired height of fill level on one side of the conveyor line, with the X-Ray tube on the other.

When a can passes through the ray trap, if no fluid is encountered at the beam level, the ray passes through the can and actuates a solenoid valve which opens a compressed air line, thereby permitting the high pressure air stream to blow the off-measure can from the line and into a receptacle provided for the rejects.

Cans must be separated by intervals of at least $\frac{1}{4}"$ for correct operation of the sensing device

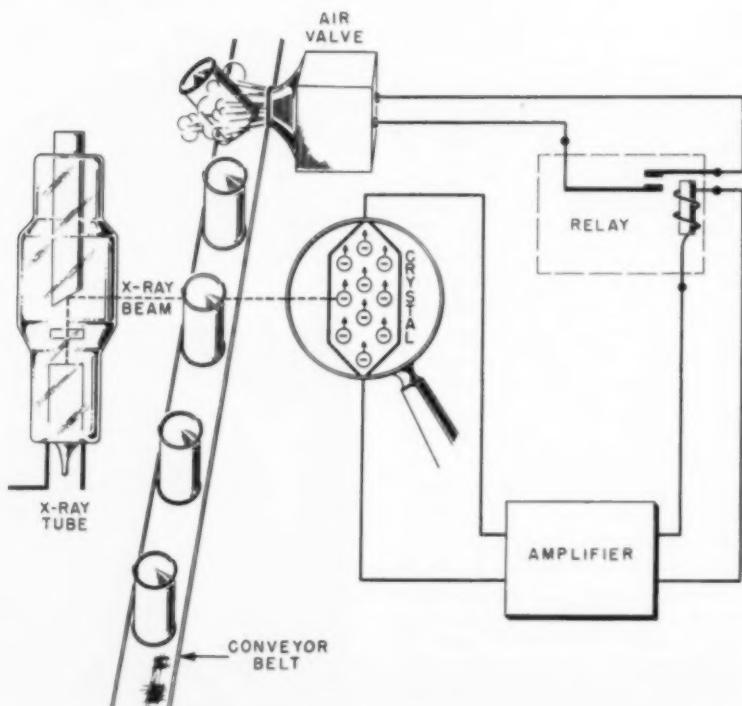
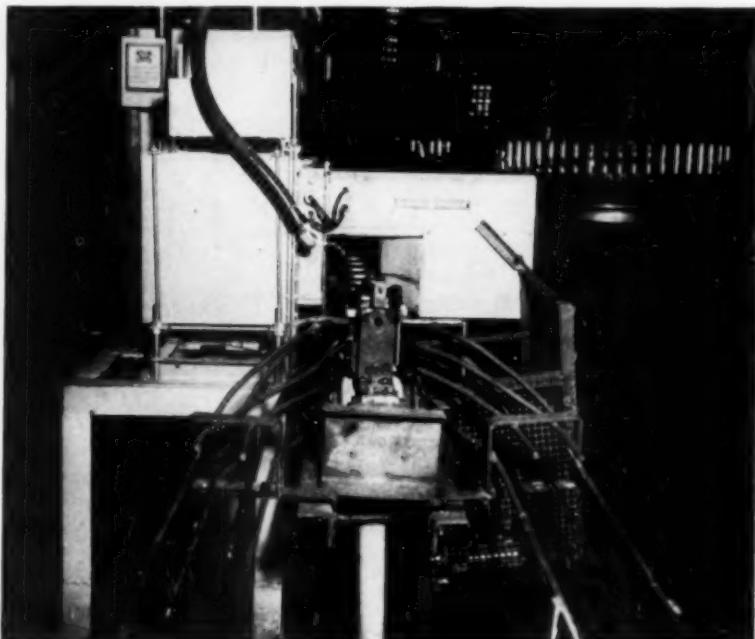


Diagram showing Hytafil operation.

Discharge side showing cans being checked.



on the installation at Borden. Production in this instance is at the rate of 340 cans per minute, although capacity is about 900 cans per minute for some installations in other applications.

Space Requirements

Very little space is required by the level checker. A solid 12" by 17" supporting platform is sufficient for the detector, and the small control unit can be set up anywhere within 50 feet of the detector.

Once controls are set initially, it is only necessary to switch the level checker on or off. Cleaning is simplified since both components can be washed down with either steam or water.

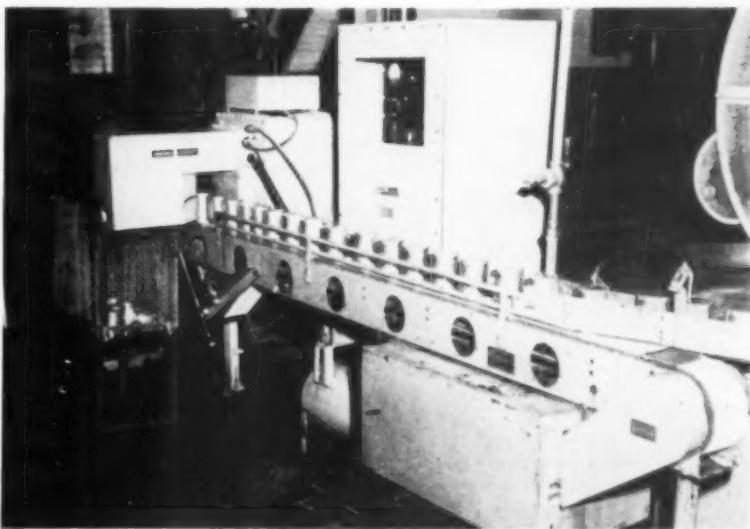
Maintenance

Initial adjustments are critical and should be performed by the manufacturer's representative; however, routine maintenance can satisfactorily be performed by plant personnel, and involves little more than cleaning of the glass windows and oiling the shutter. Tube replacements are infrequent and with the exception of the x-ray tube may be obtained from a local radio shop.

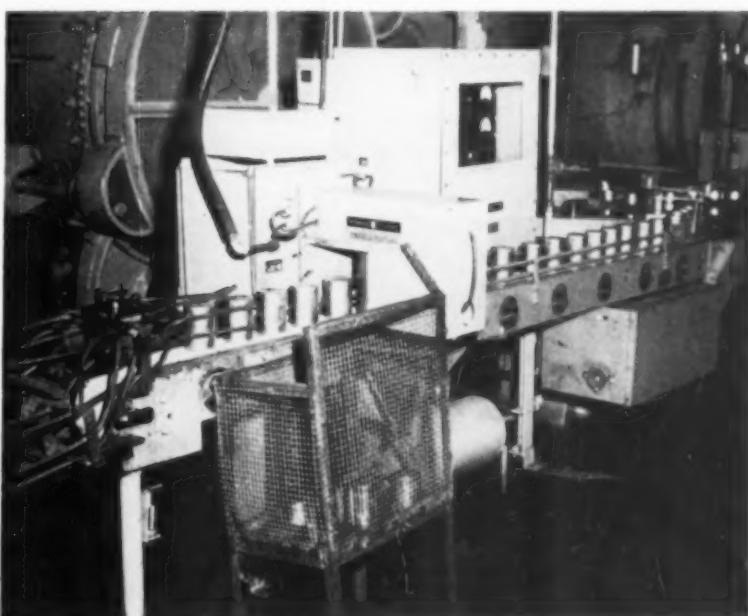
The device was supplied by General Electric and is called Hytafill. The unit in this application permits a fully automatic inspection procedure, and does a better job than was previously possible with other methods of inspection.

Before the installation was placed in operation at Borden, the human element was encountered in removing lightweight cans by using a float tank to reveal the off-weight cans. Less labor is required for the inspection operation utilizing the Hytafil machine. Minor difficulties were expected upon initial installation; however, smoother operation is attained along with more experience with the device. Some of the first applications were in the beer canning industry.

No radiation problem exists for the user of this equipment, since the beam is quite diminutive, and all shielding required is already included in the unit's design.



Entry side showing filled cans at intervals of at least 1/4".



Exit side showing basket for off-measure cans blown from line.

• • • • • HELP FOR EQUIPMENT BUYERS • • • • •

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FOR SPECIAL REQUESTS — USE CARD ON PAGE 17

Modern Production Methods Reduce Cost in

North Carolina Terra Cotta Plant

By D. W. SEWELL

Chief Engineer
Pomona Terra Cotta Company
Gulf, North Carolina

THE NEW plant of Pomona Terra Cotta Company at Gulf, North Carolina produces sewer pipe in 4", 6" and 8" sizes, along with flue lining and drain tile. It has 67,000 sq ft of floor space under roof, adjoining seven acres of yard area.

Pomona decided to extend present manufacturing capacity for three principal reasons:

1. In the last ten years technique

of sewer pipe manufacture has undergone tremendous changes. These changes were necessitated because of the labor involved by steam sewer pipe presses which have been used universally for years. Production of sewer pipe by this method requires a complete steam power plant, two or more steam presses, and a labor force of from 17 - 20 men per press. By using present day methods, the steam press is replaced by an electrically driven auger extrusion machine and automatic mechanical equipment to replace 75% of the labor.

2. The majority of all sewer pipe

Forming room, including material conveyors and pipe extruding machines.



manufactured in this country is fired in round down draft beehive type kilns. These kilns do a passable job, but they are difficult to control; they produce differential temperature and they are inefficient since they go through a cycle of setting, firing, cooling, and emptying. Sewer pipe in the smaller sizes can be safely fired in a tunnel kiln. These kilns are continuous; they produce zones of constant controllable temperature and they are very efficient because no cycle is necessary.

3. The parent plant of Pomona Terra Cotta Company located at Greensboro, N. C. is a steam press and beehive kiln operation. Without major alterations and expense, auger extrusion and tunnel kiln use could not be made. Therefore, it was decided to build a complete plant incorporating the more economical process, thereby reducing our manufacturing cost. Structural clay manufacture can be divided into five main categories: grinding, forming, drying, firing, and storage. For simplicity, the description of our plant will be broken down into these five headings.

Grinding

The grinding facilities are housed in a shed type building 60 feet wide and 110 feet long built of wooden timber and corrugated aluminum siding. One-half of the shed is used for raw clay storage and the other half is for grinding machinery.

Grinding is done by a Riddell No. 384 rim discharge grinder fed by an apron feeder which in turn is fed raw clay from storage by a rubber tired front end loader. Material passes through the grinder and falls onto a collecting conveyor which delivers to a 24 inch bucket elevator 76 feet high.

The elevator discharges onto two Star Foundry double deck electrically heated screens. The top

deck acts as a scalper for the lower deck which is the separating screen. Tailings from both screens are fed back to the grinder through a middle chute. Fines from the lower deck fall onto a collecting conveyor which is reversible as to delivery. This conveyor discharges into one of two ground clay storage silos having a capacity of 250 tons each.

Ground clay is recovered from the silos by belt feeders which are driven from a common shaft by a Link Belt fluid coupled gear motor. The material from the feed belt falls onto a delivery belt which travels into the forming building to the pipe making machinery.

The entire grinding plant is interlocked electrically as to starting and stopping. It requires two men to operate at an average capacity of forty tons of minus eight mesh material per hour.

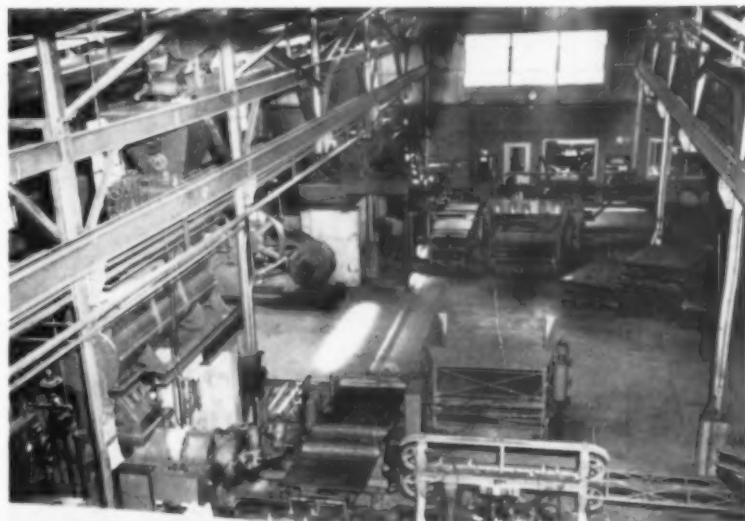
The clay delivery conveyor carrying clay into the forming building is unique. It consists of three separate rubber belt conveyors in a straight line so arranged that the head pulleys terminate consecutively over one of three small storage hoppers at each machine.

The first conveyor leading from the clay silos may either deliver into its hopper or onto the tail pulley of the second conveyor through a pivoted air operated chute depending on whether its hopper is full or empty. The second and third conveyors operate in a like manner. The material level in each hopper is controlled by electric switches.

The system is wired so when any hopper requires material, it will start the conveyors and silo feeders and will keep them running until satisfied. At this point, the system will stop or immediately deliver to any other hopper signalling for clay.

Forming Department

The forming department is housed in an aluminum building 70 feet wide and 120 feet long. In it are housed three pipe forming machines each covering a space 20 feet x 40 feet, an Ingersoll Rand 10 x 11 air compressor and three Nash vacuum pumps.



Electrically controlled pneumatic pipe extruding machine making 8" pipe. Saves more than 75% of labor required by steam press.

As was mentioned at the beginning of this article, sewer pipe at our new plant is produced by horizontal extrusion machines. These machines, manufactured by J. C. Steele & Sons, automatically mix ground clay with water in the proper proportions, press the pipe and place it upon pallets for delivery to the dryer.

Tempering is done in an open tub pug mill feeding into a vacuum chamber enclosing a 14 inch screw auger. The auger forces the tempered clay through a two piece die which forms the sewer pipe. One part of the die which forms the bell of the pipe is detached after

a timed interval. When it is clear, the barrel is extruded.

The barrel is supported by trays which rise as the pipe is extruded. When the barrel has reached its proper length, it is cut from the die and the supporting trays lower and place it on an incline plane where it rolls down onto a finishing tray.

At this station, the bell and spigot ends of the pipe are finished, then the tray tilts upward placing the pipe on another inclined plane. As the pipe rolls down this plane our name is stamped on the barrel

(Continued on page 94)

Pipe on rail cars enters preheat oven, upon leaving makes U-turn and enters 324 foot tunnel kiln, heated by oil burners.



Repair and Reconditioning of LUBRICATED PLUG VALVES



Wire brushing to remove deposits from corroded areas. Abrasive blasting might also be used.

LUBRICATED plug valves are usually worth reclaiming if their condition is such as to require only cleaning, inspection and reassembly with new packing and gaskets. Possibly, a light re-lapping operation may be required to eliminate scaly deposits and superficial scoring or pitting.

However, judgment must be exercised in cases where the valve body may require re-boring and

fitting an oversize plug; or building up of surfaces with weld metal. This type of work is not economically justified for low and medium pressure valves. As a general rule, complete rebuilding of 4 in. and smaller 175 lb WOG; or 2 in. and smaller 200, 400, 500 and 800 lb WOG semi-steel valves should not be undertaken.

Valves with a heavy accumulation of dirt, paint and other foreign

By THOMAS C. AGAIN

Chief Engineer, Sulphur Springs Division
Rockwell Manufacturing Company
Sulphur Springs, Texas

Basic Guide for Reconditioning . . . Final decision to repair or not depends on repair cost in terms of labor, equipment and overhead.

matter should be cleaned before disassembly.

After complete disassembly of the valve, parts should be cleaned by using any suitable alkaline or solvent solution. Corroded areas may require wire brushing or abrasive blasting.

Repair procedures necessary to restore the valve to good operating condition are determined by the extent and depth of blemishes in seating surfaces of both plug and body. The following are some typical cases:

Case 1. Corrosion or scoring is very shallow. Here the valve can be salvaged by relapping the plug in the body without machining seating surfaces of either the body or the plug. However, in the case of integral-shank plugs, the shank diameter and adjacent shoulder must be re-surfaced by turning or grinding, before re-lapping.

Case 2. Corrosion, galling or scoring of moderate depth. Remachining of the tapered seating surface in the body is necessary. This will usually require an oversize plug to match the oversizing of the taper bore.

Case 3. Severe corrosion, erosion, galling and deep scoring. Rebuilding of the worn areas in the body are necessary to restore the



Checking taper with feeler stock.
Valve bodies can be remachined.

TOP LEFT—Checking depth of lubricant groove is one step in valve examination.

TOP RIGHT—Lapping valve by hand. This is final step in making close body-and-plug fit.

LOWER LEFT—Applying lapping compound to bearing surface of plug.

LOWER RIGHT—Checking accuracy of fit by examining plug which has been blued, inserted into the body and rotated one or two turns under light pressure.



tapered seating surface, before machining the valve body bore. Rebuilding can be done by welding or brazing.

Valve plugs are individually fitted and lapped to the bodies by the manufacturer. Therefore, replacement plugs are furnished oversize with a semi-finished taper, to allow metal stock for fitting to re-bored bodies. Most valve bodies are designed with extra metal thickness at the tapered section to permit one or more re-boring operations without reducing wall thickness below allowable limits.

Re-Machining Bodies

An engine lathe or a vertical boring mill can be used for re-

maching valve bodies. In any case, the machine should have a suitable taper attachment or ram, capable of producing a taper angle of $4\frac{1}{2}$ degrees from the center line. In some cases the body casting need only be set true to the original bore; in others it must also be aligned with the threaded plug stem hole.

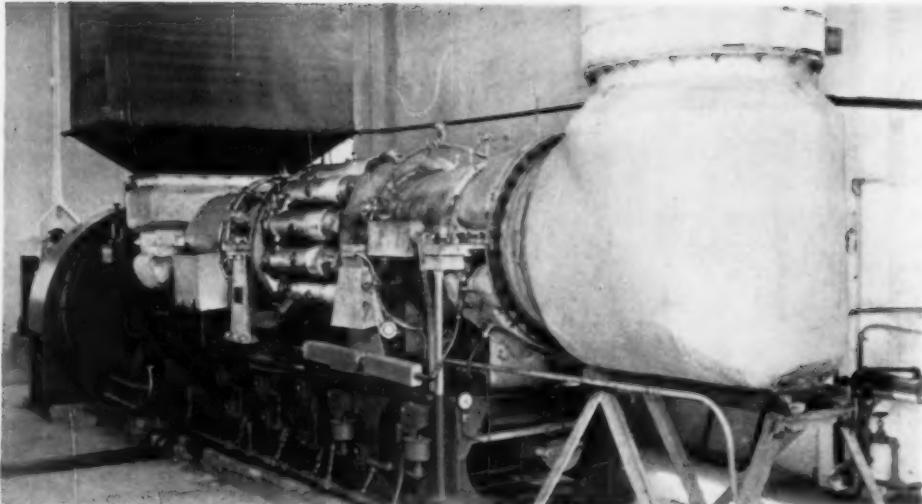
A trial cut should be taken to check correctness of setup and taper angle. Sufficient initial cuts should be made to remove all blemishes; and the finish cut should produce a clean, smooth, straight and round bore. The final finish cut must be taken very lightly, and with a fine feed, in order to produce a true taper bore.

After the bore is machined, the lubricant grooves or ducts on the body should be checked. If any are missing or greatly reduced in depth, they should be reproduced.

Machining Plugs

1. Semi-steel and Bronze—Oversize plugs, as shipped, are centered and finish-machined except for the taper section. The plugs should be placed between centers in an accurate lathe with taper attachment set $4\frac{1}{2}$ degrees from centerline. The taper should first be machined to caliper-and-scale dimensions taken from the valve body. However, sufficient metal

(Continued on page 65)



Interior view
of
gas-turbine
power plant
installation.

Gas Turbine Power Plant

Supplies Electricity for Larned, Kansas

THE CITY of Larned, Kansas has put into operation America's first municipal gas-turbine power plant. This installation marks a further important step in the use of gas turbines for electric power generation. The 1250 kw unit was supplied by the Westinghouse Electric Corporation's South Philadelphia plant.

The gas turbine is completely self-contained. It requires no boiler or other external heat source, since it burns fuel and converts the heat energy into electricity all in a single assembly. The turbine operates at 8750 rpm, and is connected to the 1563 kva, 1200 rpm generator by a single-reduction, double-helical gear.

For full operation, 28,000 cfm of air is drawn in by the axial air compressor and compressed to 53 psig. Fuel is admitted and burned in the combustion chambers to heat the compressed air to 1250 F. This hot gas expands through the gas turbine, which converts the

heat energy into mechanical energy to drive both the axial air compressor and electric generator. The gases are then exhausted to atmosphere at 780 F.

The unit is the simple, open-cycle type and is but 35 ft long, 6 ft wide, 6 ft high, and weighs only 41,000 lbs. It is equipped with a dual fuel system which allows the burning of either natural gas or distillate oil. Either fuel can be used for start-up, and a fuel change over, under load, can be made by manual operation of switches on the control board. This marks the first installation in America of a gas turbine for electric power generation which can change over, under load, from gaseous to liquid fuel and back again with no effect upon load.

Two "oil-to-air" radiator type coolers are used to cool the lubricating oil for the gas-turbine power plant. One cooler is used for normal operation, the other is available as a standby. A selector

valve permits transfer from one lubricating oil cooler to the other. Cooling air is supplied by motor driven axiflow fans automatically controlled by a thermostatic switch in the lubricating oil piping.

The gas turbine is controlled by a combination of mechanical, hydraulic and electrical components. Protection against overspeed is provided by an auto governor. The automatic and semi-automatic controls, instruments, gauges and switches for starting, operating and stopping the gas turbine power plant are mounted on a fabricated steel control panel.

The gas turbine is less expensive over-all and requires less space than a comparable engine plant or steam-electric unit. It will need relatively little operating and maintenance labor. The 1250 kw gas-turbine power plant can operate with no cooling water and is, therefore, highly flexible with regard to location.

here's how
high temperature
piping
can flex
its muscles



Each pipe hanger is scale tested to rigid tolerances by a skilled workman at the Navco plant. After final assembly and inspection, the hangers are carefully crated and readied for shipment.

NAVCO
Counterpoise
Pipe Hangers

Since high temperature piping has no respect for equipment connections, the entire piping system must flex its muscles to absorb the strain of expansion and contraction. This prevents serious stresses that could endanger the installation.

And how does high temperature piping flex its muscles? With Navco's precision engineered Counterpoise Pipe Hanger—the hanger with a load-supporting effort that is of constant value throughout the range of travel. This permits weightless movement of the entire piping system.

To learn how power plants, oil refineries and chemical plants can have piping systems that flex their muscles, write today for Navco's 12-page Counterpoise hanger bulletin #153.



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Less Noise in Texas Plant

Work Area Improved by Acoustical Baffles

By FRANCIS A. WESTBROOK

A **VERY** serious noise situation in the metal fabricating shop at the plant of the Schlumberger Well Surveying Company of Houston, Texas, was recently greatly mitigated by the use of Fiberglas baffles.

This company manufactures special equipment for the electrical logging of oil wells which is mounted on a truck chassis for field work. The shop in question is 400 ft long, 100 ft wide and with a ceiling 23 ft high in which excessive noise was created by riveting, welding, shearing, grinding, etc.

The conditions here were aggravated by reverberation of the noises from the various machines, coming from many points in the area, and being bounced around between the metal roof, brick walls and cement floor. This naturally re-

sulted in much discomfort for the 115 employees working there and curtailed their efficiency due to noise-induced fatigue and the inability to carry on conversations clearly. It was extremely difficult for the supervisors to give verbal instructions and for the workers to understand them, which caused a good deal of trouble and resulted in spoiled work.

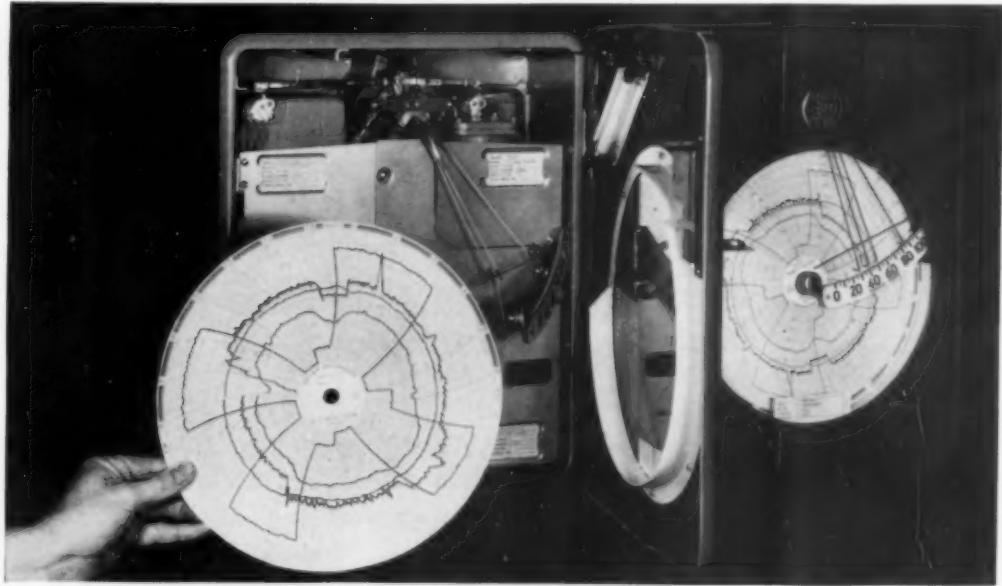
Consequently the management made an investigation of various acoustical materials with a view to correcting the difficulty insofar as practicable without extensive remodeling of the building. The decision was to use Fiberglas baffles. These baffles are made of glass fibers bonded together in the form of boards which have excellent sound absorbing properties. They are encased in plastic envelopes

which are easily cleaned by wiping with a cloth dipped in warm water with a mild detergent, without impairing their acoustical efficiency. They are also very easily and economically installed by suspending them by hooks from wires strung across the ceiling in parallel rows spaced 4 and 6 ft apart. A total of 725 baffles were hung just below the ceiling.

This method of acoustical treatment was employed because the roof girders, lighting fixtures, crane tracks and the type of roof construction precluded conventional use of tiles attached to the ceiling.

According to the shop manager, reduction of the reverberation and the volume and confusion of noises became instantly apparent.

Photo by Owens-Corning Fiberglas



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PM-1



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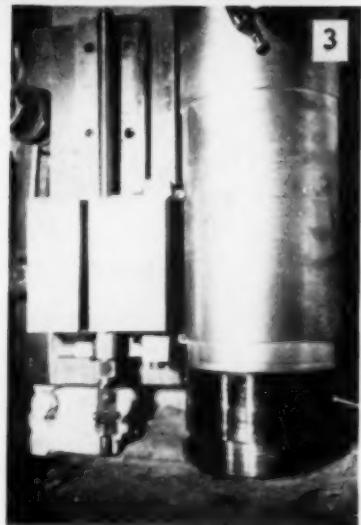
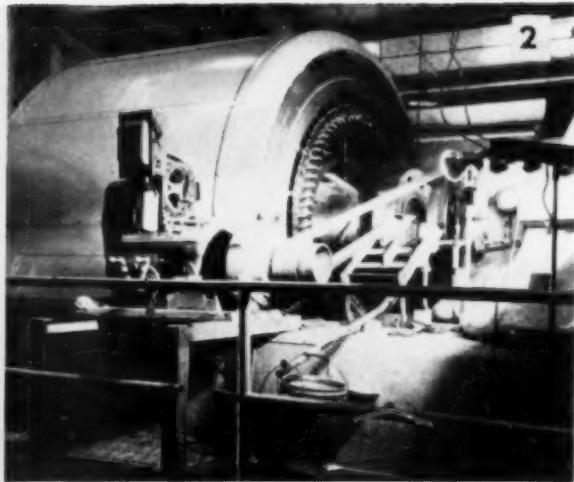
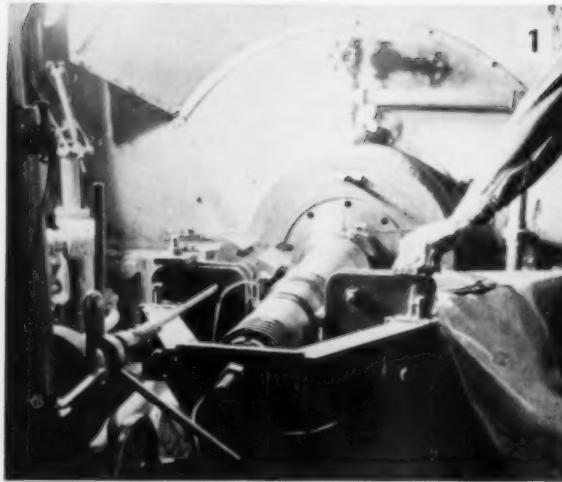
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Controls for Power and Process



Controls for
TEMPERATURE
PRESSURE
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FLOW LEVEL
RATIO DENSITY



Turbine Shaft Turned in Place

A RECENT inspection of a 7500 kw, 1800 rpm turbine revealed a hairline crack running horizontally along the number one journal of the eight inch turbine shaft. This crack was explored by spot grinding with a portable grinder and at a depth of about one-half inch it appeared that the crack stopped. This finding indicated that we should turn the shaft down to form a seven inch journal and if no other cracks appeared the shaft could be salvaged.

The problem of turning the shaft down to form the journal was complicated by the dimensions of the last turbine wheel, which in this case is 95 in. in diameter. There was not a lathe in the area that would swing the turbine spindle without removing the last several stage wheels—a very expensive, time consuming job.

The spindle could be crated and shipped to a turbine shop, but there was a good possibility that other cracks would be disclosed by the turning process. Discovery of more cracks might make it advisable to scrap the shaft, in which case the crating, wheel removal, and freight charges would be wasted.

The solution which appeared most economical and which prom-

ised to save considerable time was a plan to turn the shaft down without removing it from the turbine. The procedure described and illustrated in the pictures was worked out using the plant shop equipment. From the start to the finish only 150 man hours were used.

The first problem was to devise a temporary bearing to support the front end of the turbine spindle. A babbitt bearing was built and attached to the standard (Fig. 1) which carried the original bearing. An extension of the turbine shaft rested in this temporary bearing in such a position that the entire 19 in. length of the journal could be machined with a single traverse of the tool.

Both bearings now carrying the spindle were lubricated by the turbine auxiliary oil pump. This was a neat trick since it entailed driving the small steam driven, reciprocating oil pump with air.

The next step was setting a lathe gear head in the position shown (Fig. 2). A piece of 8 in. pipe in the lathe chuck was then

belted to the turbine coupling to obtain a variable speed drive. To start the spindle turning, it was found necessary to give it a half turn using the overhead crane attached to a coupling bolt. Once the spindle was in motion the belt drive was engaged by lowering the weight on the idler counterbalance.

A lathe compound was mounted on the horizontal joint of the bearing pedestal and the cross feed was modified to carry two turning tools (Fig. 3). Due to the amount of stock to be removed, the length of the cut, and finish desired, it was necessary to devise a drive for the compound feed screw. A convenient arrangement was worked out using the feed from a 20 in. drill press (Fig. 1).

(Continued on page 94)

YARWAY picked for “Preferred” Steam Generators

This installation of Preferred Utilities Mfg. Corp. packaged unit steam generators at a high school in New York State features YARWAY Blow-Off Valves as part of the “package”.

Not only Preferred Utilities, but many other leading manufacturers of package-type boilers now furnish YARWAY Blow-Off Valves on their units. YARWAYS make a good package boiler better.

The YARWAY Seatless Valve gives drop-tight shut-off and also eliminates the commonest source of blow-off valve trouble. *There is no seat to score, wear, clog or leak.*

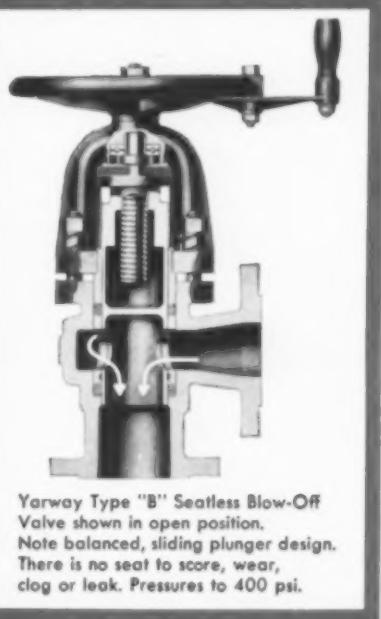
Whatever make boiler you use, specify that the blow-off valves be YARWAY Seatless. More than 16,000 boiler plants use YARWAY Blow-Off Valves—some for 35 to 40 years.

Write for full details in Yarway Bulletin B-426.

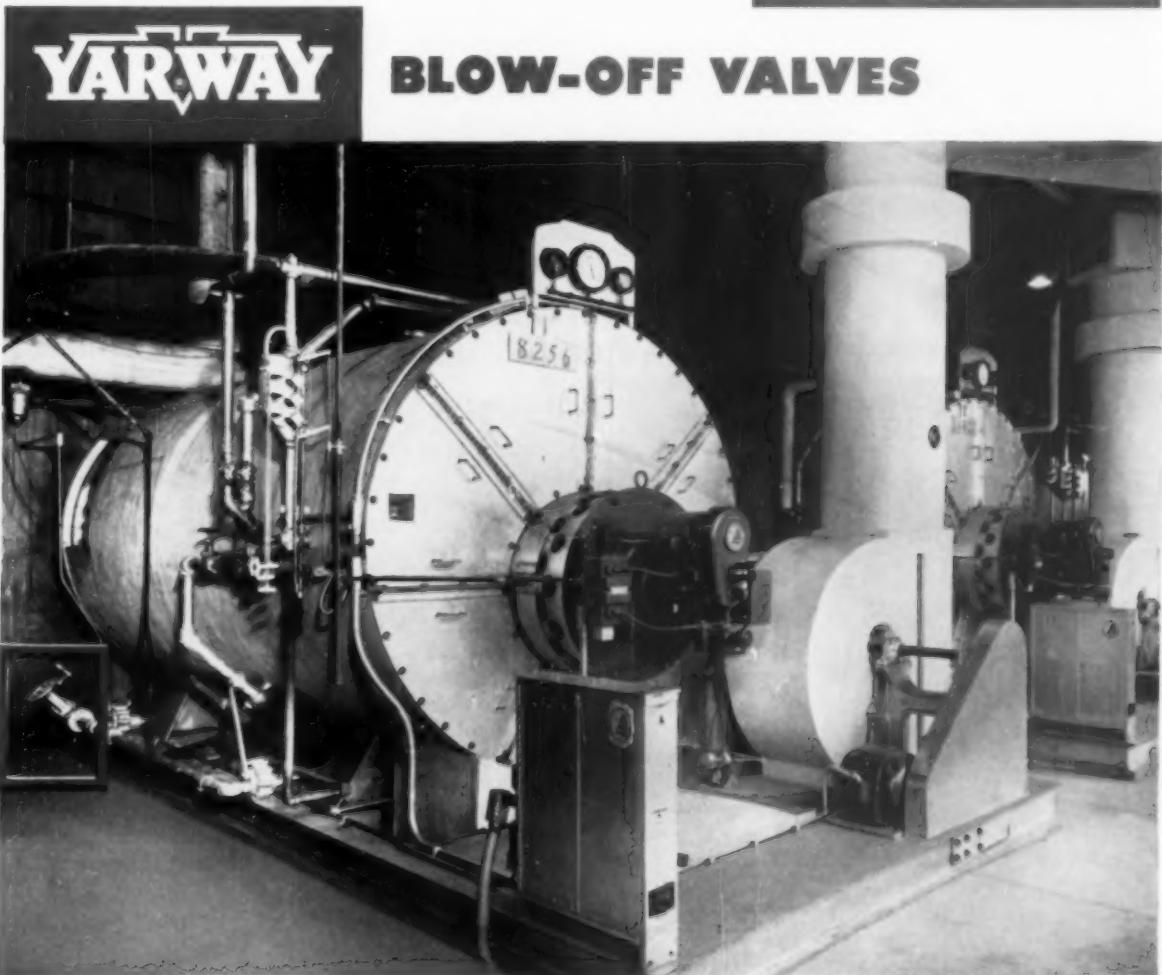
YARNALL-WARING COMPANY

Home Office: 116 Mermaid Avenue, Philadelphia 18, Pa.

Southern Representative: ROGER A. MARTIN, Bona Allen Building, Atlanta 3, Ga.



Yarway Type "B" Seatless Blow-Off Valve shown in open position.
Note balanced, sliding plunger design.
There is no seat to score, wear, clog or leak. Pressures to 400 psi.



Atomic Energy Developments

A GROUP of twenty-four private companies have received approval from the Atomic Energy Commission to design, to construct, and to operate with private funds an atomic power plant of 100,000-kw capacity. The estimated cost of the plant is \$29,100,000. Details as to when and where construction will take place have not been revealed.

This new atomic power plant has aroused considerable interest because of its advanced nature. The reactor is a fast neutron breeder which means that the moderator, required in other designs, can be omitted.

A moderator, which is a material having the characteristic ability of slowing down neutrons released during fission to thermal energy levels, is used in other reactors. In this reactor the neutrons are not slowed down (hence it is called a fast neutron breeder) and the transformation of thorium into plutonium and U-233 proceeds at a fast rate. The probability of a neutron striking the nucleus of

By JOHN F. LEE

SPI Consultant on Atomics and
Professor of Mechanical Engineering
North Carolina State College
Raleigh, North Carolina

Thorium is increased with higher neutron velocity.

Since this reactor is a breeder it will produce atomic fuel from fertile but non-fissionable substances. In fact, this particular reactor will produce more fuel than it consumes. That is, more fertile material in the form of U-238 and thorium will be bred into the fissionable elements of plutonium and U-233, respectively, than is consumed in producing power and in the breeding process.

Another feature of this reactor is its size. The reactor core will be three feet in diameter and the overall diameter of the reactor will be only 10 feet.

The original proposal for the design came from Atomic Power Development Associates, Inc., a combine of twenty-five electric

power companies and four industrial organizations. Eighteen electric power companies and six engineering firms have joined hands in plans to construct the plant.

Atomic Fusion

The possibility of taming a thermonuclear reaction, such as occurs in the hydrogen bomb, for the production of power received new impetus when the Atomic Energy Commission revealed recently that "Project Sherwood" is concerned with this objective. At present the prospect of controlling thermonuclear reactions for peaceful purposes is dimly remote. However, Project Sherwood might come up with new information which could bring the whole idea into the realm of possibility. After all, the hydrogen bomb itself was considered a wild idea only a short time ago.

In the thermonuclear reaction, two atoms of deuterium (double-weight hydrogen) or tritium (triple-weight hydrogen) are fused into helium with the release of a tremendous quantity of energy. An almost inexhaustible supply of deuterium can be readily obtained from the ocean. So far so good, but now the problems enter. The temperature during the explosion



A MODEL OF A CORE OF A REACTOR similar to the one B&W has contracted to build for Consolidated Edison's proposed atomic power plant at Indian Point, N. Y. Cutaway in center of photo shows fuel element plates where actual atomic fission will take place.

The core was part of a display at the first U. S. Trade Fair of the Atomic Industry held September 27-29 in Washington, D. C. Alfred Iddles, (left) president of The Babcock & Wilcox Company, describes the model to Dr. Willard F. Libby of the U. S. Atomic Energy Commission.

of a hydrogen bomb is of the order of 100,000,000 degrees. How to reduce this temperature to a manageable value and how to control the rate of the fusion process are the major problems to which the scientists have no answer. No matter how hopeless the outlook may appear to be, the U. S., Britain and Russia are hard at work on the problem.

Surface Vessels

An aircraft carrier of the Forrestal class will be powered by an atomic power plant according to a recent announcement made by the Navy. Construction of the atomic powered carrier will begin in late 1956, or 1957 at the latest.

The plans for an atomic powered aircraft carrier are only part of a long-range program for atomic powered surface vessels for the Navy. The first part of this program was initiated about a year ago when Westinghouse Electric Corporation was awarded a contract for research and development work. At the same time, Newport News Shipbuilding and Dry Dock Company and Bethlehem Steel Company were awarded contracts to design large nuclear-powered ships.

The reactor under consideration for ship propulsion is a pressurized-water type similar to the one used in the submarine Nautilus. Work is now in progress on the construction of a prototype of a large reactor, for use in ships, at the National Reactor Testing Station at Arco, Idaho. The estimated cost of the reactor is approximately \$19,000,000 and \$6,000,000 will be spent for the testing facilities.

The atomic aircraft carrier will not be ready to join the fleet until 1960 at the earliest. This will be after the first atomic-powered aircraft take flight in 1958 or 1959.

While plans are being made in this country for an atomic aircraft carrier, the British are taking a hard look at atomic powered merchant vessels. The British have already pioneered in the design of gas turbine merchant ships and their initial success with the gas-turbine driven tanker Auris has encouraged more extensive use of

(Continued on page 62)



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How Synthetic Rubber Resin Based Paint Protects Concrete Chimney — Louisiana

PAINTS based on Pliolite S-5, a synthetic rubber resin made by the Goodyear Tire & Rubber Company, are being used to maintain concrete chimney surfaces of southern sugar producing plants, thereby preventing work stoppages due to inoperative chimneys.

Recently, fifty gallons of white paint based on this resin were used to cover and recondition the 190 ft chimney of a sugar-producing plant in Napoleonville, La. Owned by Glenwood Co-Operative, Inc., the plant produces raw sugar from sugar cane, and its chimney is used to carry away smoke and bagasse waste gases. Bagasse is the waste material produced from sugar cane.

The project was undertaken and completed by the Chimney Engineering Service, a division of the St. Louis Lightning Protection Company.

In addition to the rubber resin based paint, 10 gallons of black enamel lettering paint and 10 gallons of paint thinner were required. Only ten days were necessary to complete the project where well over 5,000 sq ft of chimney surface had to be treated and painted. Only one coat of paint was necessary on the Glenwood project.

Paints based on Pliolite S-5 were selected because of their excellent weather-proofing characteristics, self-cleaning properties and breathing-type water repellency.

Advantages

Previous coatings on the Glenwood chimney had not proved satisfactory. Exposure to varying weather conditions and temperature extremes resulted in several fractures and an extremely porous condition on the chimney's surface. As a result, moisture infiltration rusted out the underlying reinforcing steel and necessitated reconditioning of the chimney.

Method

Employing an external bracket type scaffold and starting from the base of the chimney, workmen "hammer-tested" the entire surface for loose fragments in the outer shell as they scaled the structure.

Loosened shell was cut away and the underlying concrete was deeply scored and coated with a bonding fluid. A prepared mortar mix, waterproof and acid resistant, was then trowelled in to conform to the contour of the chimney. Areas where spalling had occurred were similarly treated.

In pitted areas one inch in depth or over six inches in diameter, new mortar had to be supported by means of expansion shields and lugs which were anchored in to provide new reinforcing steel.

As the workers moved up the chimney, the entire surface was



wire brushed to remove all loosened dirt, grease and deteriorating surface cement. This prepared the surface for proper adherence of the rubber resin based paint.

Upon reaching the top of the chimney, workmen dropped down in a swinging scaffold with a bos'n chair and applied the paint. Black enamel paint was used at the very top of the chimney to offset the possibilities of discoloration due to the steady stream of smoke issuing from the top of the chimney.

After the chimney was painted, the lettering was retraced in black enamel lettering paint, the same as that used at the top of the chimney.

Atomic Energy Developments

(Starts page 60)

these engines. Now the British are applying the same pioneering spirit in the adaptation of nuclear power for its merchant fleet.

Work on atomic-powered merchant ships is being carried out by the British Shipbuilding Research

Association, a private group supported by the industry. This group consists of practical engineers who are taking a hard look at costs and other considerations of a practical nature. Scientific advice will be given by the personnel of the Harwell Atomic Research Station.

No one expects that atomic-powered merchant ships will appear on the high seas for some time. After all, the cost considerations for naval and mer-

chant vessels are quite different. Nevertheless, the development of atomic-driven naval ships and a concentrated effort on atomic power for merchant vessels could produce surprising results. Therefore, the whole program deserves careful watching by maritime interests in this country. It is also clear that land-based power plant developers can only gain from the advances made in the maritime applications.

why
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need
less fuel

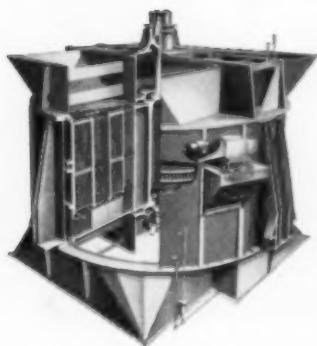
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With every 45-50 F of air preheat — you cut your fuel bill 1%. That's why it pays to equip your boilers with Ljungstrom Air Preheaters. For the Ljungstrom is the most efficient air preheater there is.

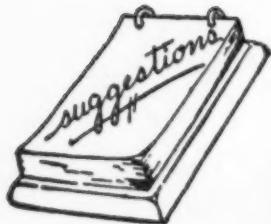
- *****
• **Advantages of the Ljungstrom Air Preheater**
• Size for size, recovers more heat than any other type.
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• Eliminates cold spots . . . keeps corrosion to a minimum.
• Easier, faster to clean and maintain.
• Requires far less supporting steel and is quickly erected.

The Ljungstrom also gives industrial plants broad latitude in their choice of fuels. Its unmatched preheating efficiency makes practical and effective such low-grade fuels as saw and paper mill refuse, wood, lignites, peat and bagasse.



Outright fuel economy is reason enough why 7 out of 10 modern preheater installations are Ljungstrom, and why Ljungstrom percentage of installed boiler capacity increases every day. Yet it's just one of the many advantages of the Ljungstrom. Get all the details on why the Ljungstrom cuts fuel costs . . . why it's the most efficient heating surface on the modern boiler . . . why it's easier to clean and maintain. All the details are in the new, 38-page reference manual, "Ljungstrom Air Preheaters." Write for it, today.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.



HELPING the MAN-IN-THE-PLANT

Ideas . . Methods . . Gadgets

Chemical Pump For Water Softener

FOR BEST control of chemicals fed to hot lime-soda-ash and hot phosphate softeners under all load conditions, the use of a Milton-Roy metering pump has proven very successful at Pasco Packing Co., Dade City, Fla. This

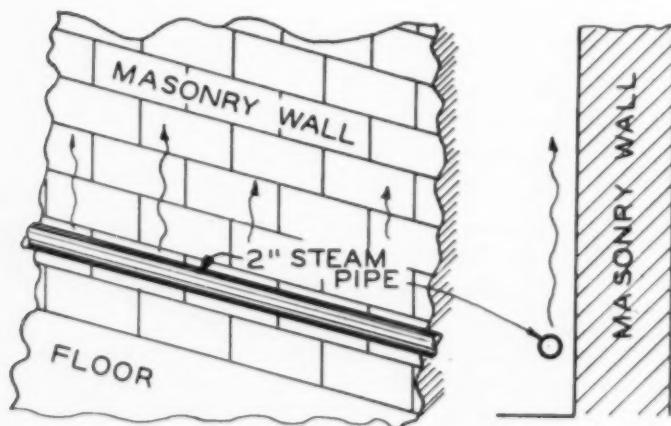
installation saves approximately 11 hp in motor load since the duplex pump uses only a $\frac{1}{4}$ hp motor instead of a $7\frac{1}{2}$ and a 5 hp motor previously needed. In addition to the saving in horsepower, better control of chemical feed is achieved. For plants having sufficient compressed air, a Milton-Roy Roymetric pump can be used.

The $\frac{1}{4}$ hp pump operates on

direct current through a General Electric Thymatrol Controller. Motor speed is controlled by a Hays-Penn flow controller containing a variable resistance which actuates the Thymatrol controller and adjusts motor speed and pump strokes per minute in proportion to the amount of water flowing to the softeners. This is especially beneficial for plants where loads vary over a wide range.

Advantages

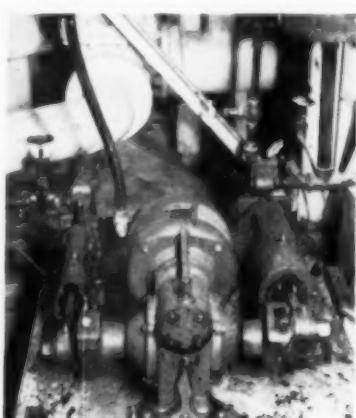
Aside from the savings in horsepower, no dilution water is needed with the Milton-Roy metering pump as it will handle heavy slurry without dilution. The lime-soda charge can be increased in the chemical mixing tank and a heavier slurry used so that the amount of time spent in charging the chemical tanks is reduced. A more concentrated phosphate solution can be handled, which again



Steam Pipe Prevents Moisture Condensation

AN ALABAMA textile mill solved a problem of excessive moisture condensation in the weave room by installing a single steam pipe along each wall of the room. The pipe was located a few inches above floor level. Heat from this pipe rises along the surface of the wall and has a drying effect, thereby preventing the accumulation of an excessive amount of moisture condensation on the wall. The trouble was experienced primarily on brick walls in the mill.

Condensation ran down the wall and formed water puddles on the floor before the steam pipe was installed. The puddled water created a hazard in addition to presenting an unsightly mess. Now the water is evaporated before it reaches the floor level. The steam pipe was a simple installation and solved the entire problem satisfactorily.



Milton Roy duplex chemical pump. Right cylinder handles lime-soda ash slurry, and left cylinder pumps phosphate to softener.

saves mixing and charging time for the operator.

When only lime-soda or hot phosphate softening is used, single pumps may be employed. A flow metering device is necessary, however, to change pump speed. The length of stroke is adjustable so that optimum concentrations of chemicals may be used. For phosphate and corrosive chemicals stainless steel or monel pump parts should be specified.

When pumping a heavy slurry of lime, soda ash, sodium aluminate for primary water conditioning, it was found that flow resistance in the discharge line increased the motor load momen-

tarily on the discharge stroke of the pump to a point where the motor tended to overheat and current demand was very unstable. The addition of a surge chamber in the discharge line stabilized this condition.

The design of the surge chamber may be unique in that condensate flows into the bottom of the surge chamber and through the connecting pipe to the pump discharge line. This arrangement serves to flush the discharge line between strokes of the pump on light softener loads and also prevents stoppage of the pipe connecting the surge chamber to the discharge piping.

Another connection to the pump suction line allows periodic flushing of the pump suction to prevent or free stoppage by simply opening a valve when desired. A gage glass on the side of the surge chamber provides visual checking to be sure that the surge chamber always contains ample air for cushioning effect. The condensate stays under the air cushion. This surge chamber and flushing arrangement has made possible the use of a lower pressure pump and less horsepower with no difficulty in operation.

By A. T. LOHKAMP, Engineer, Pasco Packing Co., Dade City, Florida.

Venting Fundamentals for Storage Tanks

PRINCIPLES of venting flammable liquid storage and process tanks for effective operation, fire protection and low-cost maintenance were recently outlined by engineers of The Protectoseal Company.

Operating

1. When filling tank, relieve pressure build-up to prevent rupture.
2. When pumping out, provide vacuum relief to prevent collapse of tank.
3. Control tank breathing to reduce evaporation losses.
4. Conserve loss of inert gases used in blanketing systems.
5. Provide safeguards for emergency conditions.

Fire Protection

1. Install flame arresters on all openings where liquid content of tank has a flash point of 110F or below.
2. Provide sufficient venting capacity to relieve pressure build-up in the event of surrounding fire.
3. Observe tank venting require-

ments given in National Fire Protection Association Reference Tables.

Maintenance

1. To fulfill operating functions, vent passages must be kept clean.
2. Valves should be easily accessible for cleaning and replacement.
3. Flame arresters should be visible to facilitate inspection.
4. Flame arresters should be readily removable for periodic cleaning.
5. Tank interior should be safeguarded while servicing arrester.
6. Arrester structures should be designed to prevent distortion during cleaning and reassembly for the purpose of retaining original Factory Inspection Standards.
7. Wherever possible, use self-draining flame arresters and valves to prevent accumulation of condensate and moisture.

Complete explanation of these principles as applied to non-conservation venting and conservation type venting is presented in "Venting Fundamentals" available from The Protectoseal Company, 1920 So. Western Ave., Chicago 8, Ill.

How To Repair Lubricated Plug Valves

(Starts page 52)

should be allowed for final matching of taper and diameter.

After the plug is turned down to the point where it will enter well into the body seat—but not all the way—the taper should be checked very closely with strips of "feeler stock" placed between the plug and body near both ends of the taper.

After the taper is exactly matched, further light cuts are taken until the plug enters the body with the plug shoulder below the body gasket seat a distance about equal to the "minimum" dimension allowed by the manufacturer. This will allow for a slight further "drop" of the plug in the final lapping operation—without exceeding manufacturer's "maximum" dimensions.

2. Steel—Plugs for steel valves require a hardening treatment between machining and lapping operations to prevent galling and seizing in the valve body. While steel replacement plugs can be heat-treated, they are furnished soft, to permit turning the taper to fit re-bored bodies. Therefore, rebuilding of steel bodies should not be undertaken in the field unless

Ideas & Methods (Con't)

suitable heat-treating and grinding equipment are available.

Lapping

Lapping cannot be used to correct deficiencies in previous machine work. Excessive lapping will produce irregularities in seating surfaces and may cause the plug to fit too deeply in the valve body.

If preliminary machine work has been done properly, it should be necessary to do only enough lapping to take out tool and grinding marks and produce a "satin" finish on the taper surface.

Before the lapping operation is started, all sharp edges of both body and plug should be de-burred and bearing surfaces should be cleaned.

Valves may be lapped by hand or with an upright drill press. If the latter is used, the valve body should be secured to either the table or the base and the plug rotated through a floating attachment connected to the spindle. Sufficient "float" must be provided to prevent the plug from lapping out of round in the body.

For smaller size valves, additional weight on the plug may be required to provide sufficient pressure, and for larger valves, it may be necessary to counter-balance part of the plug weight.

The lapping compound may consist of a 220-Grit Aluminum Oxide for steel, or a 200-Grit Silicon Carbide for iron valves. The grit is suspended in a non-lubricating oil emulsion.

During the lapping operation, the plug should be lifted approximately $\frac{1}{4}$ - $\frac{1}{2}$ in. out of the body,

depending upon the plug size and lapping compound consistency, after each four or five revolutions.

Lapping is continued until all machining marks disappear and the surface shows a uniform "matt" finish. Rotation of the plug in the body should now show an even metal to metal contact, without excessive bright or dark areas. The accuracy of the fit can be checked by blueing the plug into the body and rotating it one or two turns under light pressure.

The same requirements as indicated for lapping with a drill press hold true for hand lapping. In the latter case, however, the plug is usually oscillated four or five times between each lifting of the plug out of the body.

After the lapping is completed, the depth of the plug in the body should be checked against manufacturer's specifications.

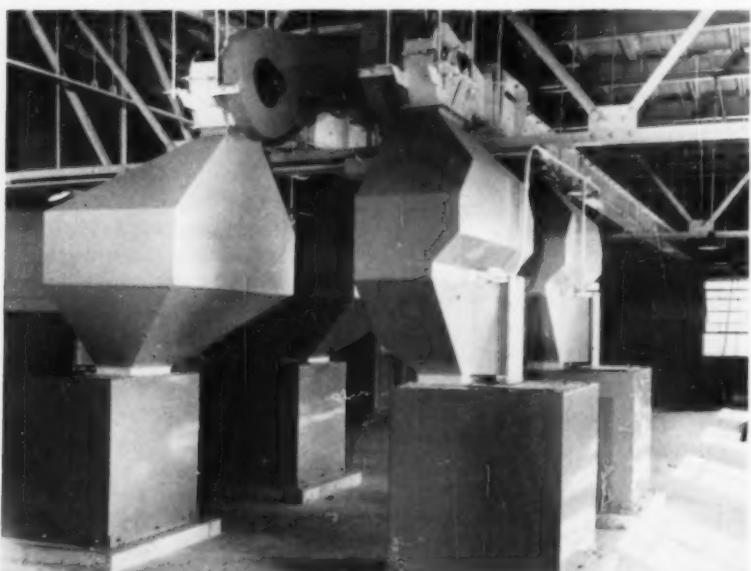
Handling Water Treatment Chemicals

A BIG factor in handling lime and soda ash in the "push-button" system furnished by Stephens-Adamson for Radford Arsenal in Radford, Virginia, is protection from moisture and pre-

vention of dusting. The Redler conveyor and elevator units have sealed casings. They are also self-feeding and provide thorough cleanout between runs.

Lime and alum are dumped into

Stephens-Adamson installation at Radford Arsenal



steel hoppers through covered, ground level openings. From this point a single push-button controls the flow of material to inside bins. Alum and lime flow into L-type Redler units through motor operated gates under the receiving bins. Elevated 50 ft, the material discharges to 50-ft long horizontal Redler units which carry to either of two storage hoppers. Tellevel bin level controls shut off the feed gates when hoppers fill.

An automatic timing system then takes over and runs the conveyors until they are thoroughly cleaned out. Following the cleanout run the start button is automatically reset, ready for another cycle to begin. The twin Redler systems are made up of 5-in. units with the alum conveyor-elevators handling 3 tons per hour and the lime 2 tons per hour. Special cleanout flights in both systems prevent material from accumulating inside the casing.

A special casing design for the pulverized alum prevents this material from aerating and flushing into the conveyor system. All connections are gasket sealed except for surface ground connections which are inherently dust-tight. Head and tail shafts turn in Sealmaster bearings.

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Cameron & Barkley branch offices in Charleston, Savannah, Jacksonville, Orlando, Tampa and Miami are at your service for every grating application. For a copy of the new illustrated catalog on Electroforged Steel Grating, contact the branch office nearest you, or write or phone The Cameron & Barkley Co., 160 Meeting Street, Charleston, South Carolina.

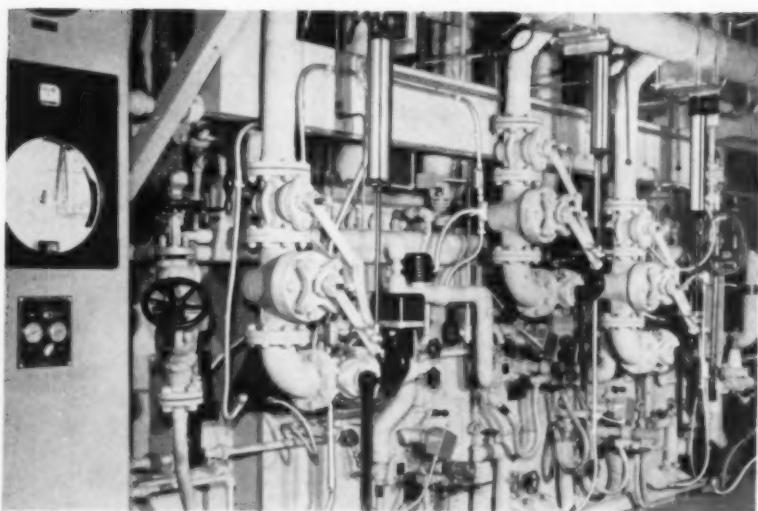


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GRATING APPLICATIONS: floors • platforms • walkways • catwalks • stair treads • fan guards • shelving • and many other uses, both outdoors and indoors, for versatile steel grating



Conversion to "Controlled-Air-Power"

SIMULTANEOUS hand-operation of two 4 in. valves requires considerable force, even with the mechanical advantage of a long operating lever. This, along with the safety hazard presented by the lever and its operation prompted the installation of Bellows Air Motors to do the "muscle work" at the modern power plant of Georgia Institute of Technology, Atlanta. Mr. John D. Powell, Utilities Engineer at Georgia Tech, feels

that the installation may be of interest to others faced with similar problems.

The three dual valve arrangements shown in the photograph serve as master shut-off cocks in fuel supply lines to steam generator units. Burners of the steam generators are fed natural gas at a pressure of 2.5 psi. In each dual arrangement the upper valve is a 2-way type, used as a simple shut-off device. The lower unit is a 3-way valve,

Only a flick of the air motor control lever is needed to operate the heavy valves in Georgia Tech's modern boiler plant.

placed in the line between the burner and the 2-way cock. The two valves are mechanically interlocked to open and close together for reasons of safety. In the "open" position, the 3-way valve allows uninterrupted flow to the burner and its controls. In the "closed" position, however, its 3-way construction permits gas which may be trapped between the shut-off cocks and the burner to be exhausted to atmosphere.

Now only a flick of the air motor control lever is needed to operate the heavy valves. Mr. Powell, who is responsible for the conversion, finds that the built-in valve construction of the Bellows Air Motor minimizes installation problems. Note that he has simply bolted the pivot mounted air motors to plates suspended from a convenient pipe line by means of U-type hangers. The built-in control valve, characteristic of Bellows Air Motors, means that only one air connection is required. The integral speed controls permit accurate, independent regulation of valve opening and closing speeds.

Tests Of Nylon Rope

TESTS conducted by the Pittsburgh Testing Laboratories show that a knot in a Manila rope reduces the strength when used in a straight pull. Since a knot is the only practical method of fastening to many structures, it is often necessary to find rope that can safely be attached in this way. The following tests show what strength might be expected:

A 200 lb weight was selected. A section of steel I beam was a solid dead weight which had to be stopped all at once—much like the snubbing of a human body caught in a safety belt.

TESTS ON SAFETY ROPE

Size	Kind	Minimum Breaking Load		Per Cent Full Strength
		Splice	Knot	
1/2	Manila	2,650	1,130	45%
5/8	"	4,400	1,950	44%
3/4	"	5,400	2,450	43%
1/2	Nylon	3,900	3,160	79%

An acceptable rope should hold the weight with a free fall of 6 ft since that is about the length of safety line that is permitted.

It was found that 1/2 in. rope broke with a fall of only 4 ft. The smallest first grade Manila rope that would hold without breaking was found to be 3/4 in., but this was considered too bulky to be

practical. It was thought that 9/16 in. diameter would be the largest practical size suitable for use, and several different types of rope construction, including yacht rope, utility rope and special reversed twist rope (all in this size) were tried, and all failed under the 6 ft drop.

Extensive tests were then made

using $\frac{1}{8}$ in. diameter spun staple nylon rope. This rope proved strong enough for a 6 ft fall, and then the distance was extended 9 ft and the rope proved ample for this with no damage. One strand was then removed from the nylon rope leaving two strands, and it was checked with a 6 ft fall. The two strands still proved ample, which shows there is sufficient strength and factor of safety. Even with one strand damaged in the rope, we would still have a safe rope.

The next test was made for relative shock in the use of nylon and Manila rope. A $\frac{1}{8}$ in. diameter steel rod was attached to the dropped weight with $\frac{1}{4}$ lb on the end of it. This might represent an arm or leg, or even a man's neck with a head on the end of it. When the weight was checked with the $\frac{1}{8}$ in. nylon rope, however, the rod did not bend, showing that the impact was much less because of the cushion elasticity and cushion provided by the nylon rope.

A $\frac{1}{8}$ in. Manila rope was next tied to the support and a 6 ft length of nylon rope was tied to this. In the 6 ft drop, the Manila did not break. This shows that the nylon rope so cushioned the fall that the shock was insufficient to break the $\frac{1}{8}$ in. Manila rope and, therefore, would provide much less shock should a man fall when using nylon rope.

Another conclusion may be drawn here as to the safety of this rope since tests show that $\frac{1}{8}$ in. nylon rope is three times as strong as $\frac{1}{8}$ in. cushion Manila. With the cushion provided by the nylon, only one-third of its strength is required.

Nylon Advantages

Experience shows that deterioration of this nylon rope under normal conditions is negligible. The rope used in the tests was purchased three years previously and had been stored in a field office where heat and dampness alternated with the seasons. Fifty safety belts were field tested after being equipped with nylon lines. All reports received were favor-

(Continued on page 72)



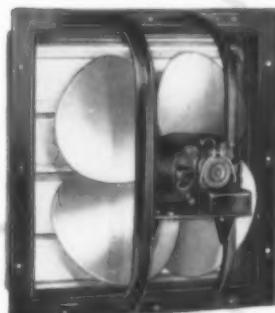
Emerson-Electric air circulator. Two sizes—capacities: 6,500 C.F.M. for 24-in. size; 8,400 C.F.M. for 30-in. size... Four mounting styles.



Emerson-Electric ceiling fan. Two sizes—36-in. and 52-in. Electrically reversible and non-reversible models—capacities up to 7,000 C.F.M.

"Active Air"

...good for business



Emerson-Electric direct-drive exhaust fans with shutters attached. Three sizes: 12-in., 16-in. and 18-in. Capacities up to 3,100 C.F.M.

Make everybody comfortable by putting "ACTIVE AIR" to work in restaurants, institutional buildings, stores and shops with these three famous Emerson-Electric fans. It's good for business. There's a type and size for every purpose—all backed by Emerson-Electric's long-standing reputation for highest quality... They quietly move large volumes of air—have accurately balanced blades—are noted for long life, low maintenance and operating costs.

Write for Catalog No. 2046.

**THE EMERSON ELECTRIC MFG. CO.
ST. LOUIS 21, MO.**



Emerson-Electric
of St. Louis • Since 1890

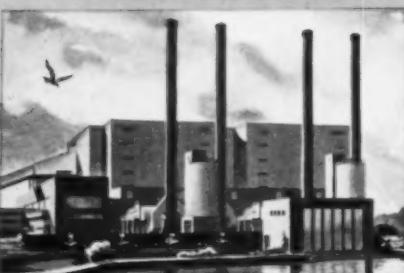


1

KANAWHA RIVER

9113

**Appalachian Electric Power Co.
on the American Gas and Electric System**
Two B&W Pressure-Fired Radiant Reheat Boilers with
Gas Recirculation and Divided Furnace Construction.



2

ST. CLAIR

9240

Detroit Edison Co.

Four B&W Radiant Reheat Boilers with Gas Recirculation
and Divided Furnace Construction.



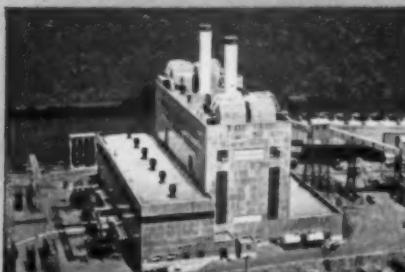
3

TANNERS CREEK

9251

**Indiana and Michigan Electric Co.
on the American Gas and Electric System**

Three B&W Pressure-Fired Radiant Reheat Boilers with
Gas Recirculation and Divided Furnace Construction.



4

SHAWVILLE

9310

Pennsylvania Electric Co.

Two B&W Radiant Reheat Boilers with Gas Recirculation
and Divided Furnace Construction.



5

MUSKINGUM RIVER

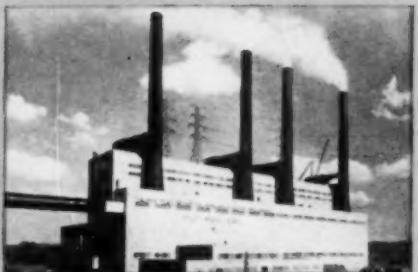
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**Ohio Power Co.
on the American Gas and Electric System**
Two B&W Pressure-Fired Open-Pass Reheat Boilers
with Gas Recirculation.

6

EASTLAKE

9386

The Cleveland Electric Illuminating Co.

7

PHILIP SPORN

9417

**Appalachian Electric Power Co. and Ohio Power Co.
on the American Gas and Electric System**

Four B&W Pressure-Fired Radiant Reheat Boilers with
Gas Recirculation and Divided Furnace Construction.

8

KEARNY B

9556

Public Service Electric & Gas Co.

9

BARRY

9557

Alabama Power Co.

10

JUSTIN R. WHITING

9574

Consumers Power Co.

Three B&W Radiant Reheat Boilers.

10

BEST ANNUAL HEAT RATES

**reflect INCREASING EFFICIENCY
in power generation**

Annual plant net heat rates of the ten most efficient central stations in the United States in 1954 — as reported by the Federal Power Commission — are led by Kanawha's record 9113 Btu per net kwhr. They are strong vindication of the foresighted utilization of major engineering advances which are taking this nation so far and so fast along the road of power generation progress. And the development of these advances has been possible only through the efforts of the electric companies and their primary suppliers working cooperatively to provide more electricity more efficiently.

In most of these leading stations, B&W Boilers designed with the most advanced features are contributing substantially toward achieving the remarkable plant efficiency levels reported. For example, at Kanawha the B&W vertically-fired Radiant Boiler units utilize:

PRESSURE-FIRING

To eliminate air infiltration, reduce stack loss and assure greater efficiency.

CYCLONE STEAM SEPARATORS

To assure positive natural circulation at high pressures with lowest auxiliary power cost, and send steam of highest purity to the turbines.

DIVIDED FURNACE CONSTRUCTION

To hold building volume to the minimum while achieving required furnace cooling surface.

Just behind the ten leaders are more plants — many with B&W Units — producing abundant, economical power in all parts of the country.

Welcoming its responsibilities as a major supplier, B&W continues to apply the knowledge derived from almost a century of boiler engineering, design and fabrication experience. And to help foresee the needs of the future, the practical results of an extensive B&W program of research and development are continuously being enlisted in the efforts to achieve still higher levels of steam-electric generating efficiency.

G-738



BOILER
DIVISION

Ideas . . Methods . . Gadgets (Continued)

able. While this rope is considerably more expensive than the best grades of Manila rope, it is believed that its greater durability will materially offset the increased cost.

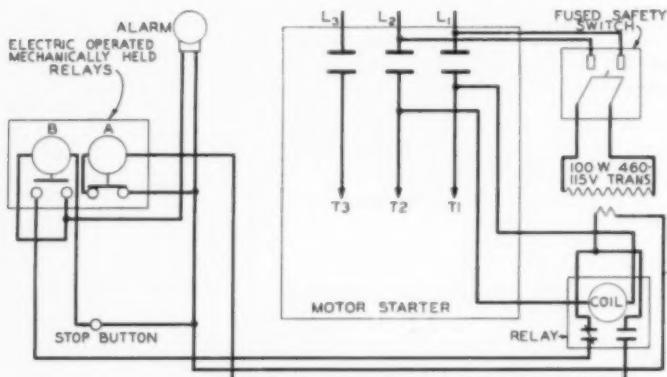
Nylon rope has also proved superior in the safety shower which is an indispensable device in every well managed chemical production plant or laboratory. Heretofore, it has been something of a problem to properly maintain the pull chains or ropes associated with the showers. Even galvanized chains had but limited field life because of the fumes in the atmosphere. And, it had a tendency to tangle up in grotesque

knots that placed it out of reach when needed in emergency.

Manila rope had still a shorter service life, and then a metal rod and "D" handle was experimented with. This proved only half effective, since it tended to be in the way of persons passing under it, especially the tall ones who lost safety spectacles.

The experiment with nylon solved the problem, since nylon neither rotted nor frayed and was undamaged by the fumes or spills. The loft riggers make up the pulls during rainy weather so that the pipefitters have them available in the storeroom.

By Paul C. Ziemke, Oak Ridge, Tenn.



A Variation in Signal Systems

SIGNAL SYSTEMS for indicating some change in an operating condition are, of course, very common. But sometimes there is a desire to do something in a different way for a certain purpose.

We had a magnetically started motor that was often in service when the operator was absent for a few minutes. If the motor stopped at such a time considerable damage and loss of production was incurred if that unit or a duplicate unit was not placed in operation immediately.

A signal system to correct this situation was installed as shown in the accompanying diagram. It was desired that the signal sys-

tem be in service at all times when the unit was operating but, of course, the signal alarm should be silent except when the motor kicked out. It was also desired that the alarm be silent when the operator was in process of restarting the unit or the duplicate unit. Of course, the alarm could be silenced by opening the switch to the control transformer but it could be possibly forgotten and left open so that the alarm would be inoperative the next time the unit was placed in operation.

How System Works

When the motor contacts close the normally open contacts of

relay C also close, thus energizing coil A of the electrically-operated, mechanically-held relay. Coil A then raises its plunger thus opening its contacts which are in series with it. At the same time it closes the contacts of coil B as the two plungers are mechanically interlocked.

At this point, with the motor running, the circuit through coil A is open because its contacts are open and the circuit through coil B is also open because the normally closed contacts of relay C are open and also the stop button is open.

Thus in normal operation with the motor running the contacts of B are closed and those of A are open.

When the motor contacts open, relay C is de-energized—putting the contacts of that relay in the positions shown. Thus a circuit is closed through the normally closed contacts of relay C and the closed contacts of relay B sounding the alarm. There is no circuit through coil A because of the open contacts in relay C and in its own contacts. Also, there is no circuit through coil B because of the open stop button but the alarm circuit is closed. When the stop button is pressed a circuit is closed through coil B thus opening the B contacts and closing the A contacts. The alarm is stopped but the circuit to it will reset automatically on the next motor start by the closing of the normally open contacts of relay C.

With this arrangement there is no question of the alarm being in circuit when required and silenced by the pressing of the stop button.

By VICTOR N. FRIEDMAN, Missouri

Protection for Instrument Tubing

A RECENT addition in a Southern paper mill called for a large amount of tubing in two sizes. The corrosive atmosphere in this building made it difficult to select tubing wisely.

Most of the lower part of the building was to be open but it was



"Business Publications tell us what's new in the food business" says

JOSEPH B. HALL, President, THE KROGER CO.

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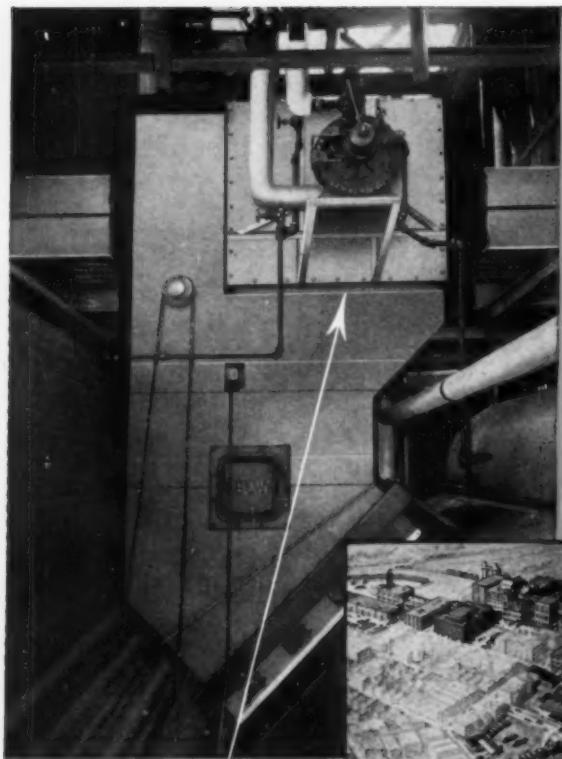
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The national association of publishers of 173 technical, professional, scientific, industrial, merchandising and marketing magazines, having a combined circulation of 4,098,937 . . . audited by either the Audit Bureau of Circulations or Business Publications Audit of Circulation, Inc. . . . serving and promoting the Business Press of America . . . bringing thousands of pages of specialized know-how and advertising to the men who make

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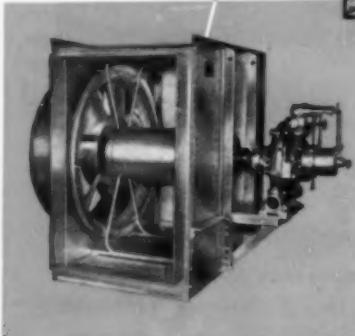
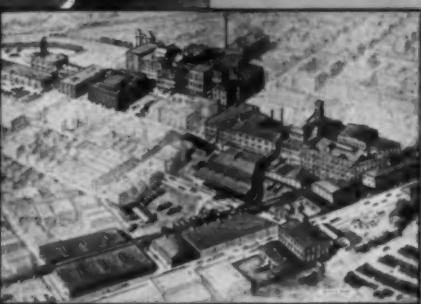
Write for list of NBP publications and the latest "Here's How" booklet, "How Well Will We Have to Sell Tomorrow?", by Ralston B. Reid, Advertising & Sales Promotion Manager, Apparatus Sales Division, General Electric Company, Schenectady, N. Y.





Showing Wing Draft Inducer installed as elbow in breeching.

SPACE PROBLEM SOLVED BY WING PACKAGED POWER PLANT DRAFT INDUCER

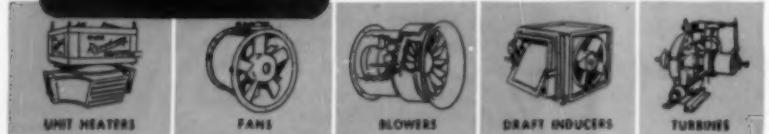


WING POWER PLANT DRAFT INDUCER
May be Turbine or Motor-Driven. Fan and bearing assembly may be withdrawn from housing for inspection and servicing.

L. J. Wing Mfg. Co.

169 Vreeland Mills Rd., Linden, N.J.
Factories: Linden, N.J. & Montreal, Can.

Wing



Ideas & Methods (Con't)

to be assembled where two sides of it would be up against adjoining structures so ventilation was not positive. The building was to be five stories high with the operating floor on top. This and the floor below it were to be enclosed for exclusion of dust. The floor below the operating floor contained a high humidity because of steam introduced into the process via mixing machines.

With the mixture of chlorine gas and moist conditions the usual application of copper tubing to carry air to the controls and back to control valves, tank levels, etc., was eliminated. Copper would stay in this application less than a week and possibly not one full day.

The complete instrumentation setup had to be considered as a whole. Part of the materials such as control panels and recorder panels would come from the company who would both build and assemble them. The recorder panel would be located at one end of the room and the various control panels would be spaced in front of their respective machines throughout the central or operating aisle.

The operating floor would be well ventilated and air-conditioned because the operators would be here most of the time. The next floor below would be ventilated but not in as good a condition. Further, any trace of chlorine always seems to get attracted to copper or bronze.

Material

Copper tubing was desired because of its flexibility, ease of cutting and fitting and fairly reasonable price. The idea of coating was considered. On further investigation this coating could be purchased in the form of tubing and slipped or formed over copper tubing.

The market could also produce these tubes in clusters even to the extent of encasing in flexible conduit similar to electric wires and cables. But on further study the runs of tubing would not be long enough to justify the high price

for a large trunk line of tube as supplied commercially by some manufacturers. And the sizes would all have to be the same which was not suitable in our case. Therefore it was decided to use the single run of tubing.

Installation

With the internal tubing being completely supplied by the instrument company, the ease of making the connections was a material advantage. Each connec-

tion was named and numbered and identified as to what application it was to be connected.

To support the vinyl coated copper tubes on the various runs we tacked on short lengths of Unistrut and clipped each tube individually by a patented spring clip sized to fit the proper tubing.

Utilizing the longest lengths of tubing possible minimized the necessary tubing connections. These connections were wrapped with light gage vinyl tape pulled to

proper tension in order to make a good tight seal. Then at a later date if this joint perchance develops an air leak this tape can be stripped off and the joint pulled up to eliminate the leak.

The installation has been in operation about 18 months and with the exception of a few changes, the majority of runs of tubing indicate very little trouble. Also the instrument men appreciate the simplicity and ease of working on the various systems.

Group Replacement Techniques in Incandescent Lighting Maintenance

THE ASPECTS of group replacement of incandescent lighting systems in a chemical plant present a problem with an interesting twist. Incandescent lighting is used here in all processing areas. Light intensity and power costs are secondary in importance with relation to lamp failure consequences and individual lamp replacement costs. The types of incandescent lighting in the chemical process buildings fall into the following three classifications:

1. High Bay 300 watt general illumination.
2. Low Bay 150 watt reflectors for operating areas.
3. 100 watt sight glass lights and specific seeing task highlighting.

The inherent nature of lighting functions fulfilled by the above classifications requires that for a group replacement plan to be practical, the replacement period selected shall result in failure of practically none of the lamps in group 3; few failures are tolerable

in group 2; more failures are permissible in group 1. The approach taken was to select a group of standard manufacture low cost street lighting series lamps which has inherently long life. Wattages and filament voltages of each of the above three classifications were adjusted to provide a successively longer life for groups 1, 2, and 3. A major concern was to limit voltage increases on existing wiring to a minimum.

Lamp application characteristics are shown in the accompanying table—giving information on the lamp previously used, and the replacement for each group.

Advantages

All lamps are burned 24 hours per day, 365 days per year. A replacement interval of 4 months was selected (approximately 3000 hours) at which time 2% of group 3 lamps can be expected to fail, 6% of group 2, and 9% of group 1. While the program has not been in effect long enough to establish

conclusive cost data, labor savings are expected to be startling. In addition, the advantage of putting lamp replacement on a scheduled instead of emergency basis simplifies supervision and administrative problems of the maintenance department.

By H. L. SCHNEIDER, Maintenance Supervisor, Monsanto Chemical Company, J. F. Queeny Plant, St. Louis, Mo.

Countersink Fitted on Drill

A DRILL fitted with a countersink shank saves time on repetitive drilling and countersinking operations. 500 of the countersinks can be made on a turret lathe in about eight hours. Soft metal should be used for woodworking and a hardened version for metal working as requirements demand.



The simple tool is made of a standard drill for the size hole wanted and a hollow countersink made on the lathe. The hole in the countersink is made to accommodate the desired drill size, and a set screw holds the drill in place (see accompanying illustration).

By CHARLES McALLISTER

LAMP APPLICATION CHARACTERISTICS						
	Watts	Lamp Voltage	Socket Voltage	Life Hours	Lumens	Current
Group 1						
Previous Replacement	300	120	120	1000	5650	2.500
	326	130	120	4500	5050	2.718
Group 2						
Previous Replacement	150	120	120	750	2650	1.250
	176	125	120	5100	2440	1.464
Group 3						
Previous Replacement	100	120	120	750	1630	.834
	102	130	120	9000	1120	.834

Better Production Ideas & Methods

M-1 Venting Principles

12-page bulletin describes principles of venting flammable liquid storage and process tanks for effective operation, fire protection and low-cost maintenance. — The Protectoseal Company, 1920 So. Western Ave., Chicago 8, Ill.

For More Free Data — Circle M-1
on the Handy Return Card — p 17

M-2 Power Pump Maintenance

20-page catalog G-2198 on "How To Install and Take Care of Power Pumps." Features frames from the Worthington Full Color, sound slide film on the same subject. Booklet is designed for use with your instruction book. Part I covers information on foundation, suction condition, piping support, cleaning, alignment, lubrication and testing. Part II on maintenance covers initial and replacement packing, packing adjustments, common types of pump bells and tips on trouble shooting common pump problems. — Worthington Corporation, Harrison, N. J.

For More Free Data — Circle M-2
on the Handy Return Card — p 17

M-4 Overhead Cranes

8-page illustrated catalog tells why the "E" type of overhead traveling crane is valuable in industry used intermittently or where high speed lifting and travel are not essential. Major components are explained. — Whiting Corporation, Harvey, Ill.

For More Free Data — Circle M-4
on the Handy Return Card — p 17

M-5 Plastic Pipe Fittings

12-page brochure covers industrial application of plasticized polyvinyl chloride pipe fittings and flanges. Installation information pressure — temperature charts, chemical resistance tables and other helpful reference data are included. — Tube Turns Plastics, Inc., 2929 Magazine St., Louisville 11, Ky.

For More Free Data — Circle M-5
on the Handy Return Card — p 17

M-6 Pneumatic Conveyors

Catalog P-56 describes pneumatic ash conveyor system for steam

plants; systems for the collection, processing, reclamation of cutting oils and metal chips; and systems to handle dry or granular materials. — National Conveyor Company, 25 Industrial Ave., Fairview, N. J.

For More Free Data — Circle M-6
on the Handy Return Card — p 17

M-7 Safety Clothing

12-page booklet covers asbestos suits, helmets, aprons, leggings, overshoes, gloves, etc., specially treated to increase resistance to heat, oil, water and abrasion. — Johns-Manville, 22 East 40th Street, New York 16, N. Y.

For More Free Data — Circle M-7
on the Handy Return Card — p 17

M-8 Wire Rope Slings

Wall chart, designed to be displayed in a prominent place in industrial plants, lists diameters and lifting capacities of ACCO-registered wire rope slings. — American Chain & Cable Co., Inc., 929 Connecticut Avenue, Bridgeport 2, Conn.

For More Free Data — Circle M-8
on the Handy Return Card — p 17

M-9 Vessel Lining

Data sheet 1012 describes Pre-Krete for lining vessels on the job.

Technology and the Liberal Arts

(Starts on page 37)

bled but "even if it were, it would account for only a small portion of the annual need."

Another source, but one which must be built up by tax changes, is revival of **individual large gifts and bequests** which, in the past, built much of the present university plant. "The ability of people to accumulate funds for such wide-scale philanthropy has now been curtailed by current tax philosophy. If some way could be found to restore even a part of this source through a more favorable and realistic tax situation, college treasurers might breathe a little easier."

The third possibility is consideration of what the educational world might do in **adapting to the conditions** which confront it. He suggested a look at American industry to see if some industrial practices could be transplanted to the educational field.

One example he mentioned was the industrial practice of using facilities at maximum potential, adjusting schedules of holidays and vacations to fit the needs of a plant that never closes down. "By staggering the vacation period, we would be able to increase substantially the number of students accommodated without an increase of physical facilities," he said. Also, better scheduling of facilities, even on existing schedules, "would provide a handsome return for the effort."

Illustrations cover preparation, lining procedure and application. — Pocono Fabricators, Inc., Division of The Patterson-Kelley Co., Inc., East Stroudsburg, Pa.

For More Free Data — Circle M-9
on the Handy Return Card — p 17

M-10 Plastic Pipe

30-page bulletin 24 covers polyvinyl chloride rigid plastic pipe outlining properties, applications, installation procedures, etc. — National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

For More Free Data — Circle M-10
on the Handy Return Card — p 17

M-11 "Packaged" Fans

28-page catalog 515 shows how Clarge V-belt Ready Units answer economically your smaller air handling requirements. 18 sizes—wheel diameters 9 $\frac{1}{2}$ to 32 $\frac{1}{2}$ ", capacities to 12,000 cfm. — Clarge Fan Company, Kalamazoo, Mich.

For More Free Data — Circle M-11
on the Handy Return Card — p 17

M-12 Steam Trap Book

44-page "The Handbook of Steam-Trapping" covers selection, installation, maintenance, capacities, etc.—Armstrong Machine Works, 806 Maple Street, Three Rivers, Mich.

For More Free Data — Circle M-12
on the Handy Return Card — p 17

M-13 Welding Pipe Fittings

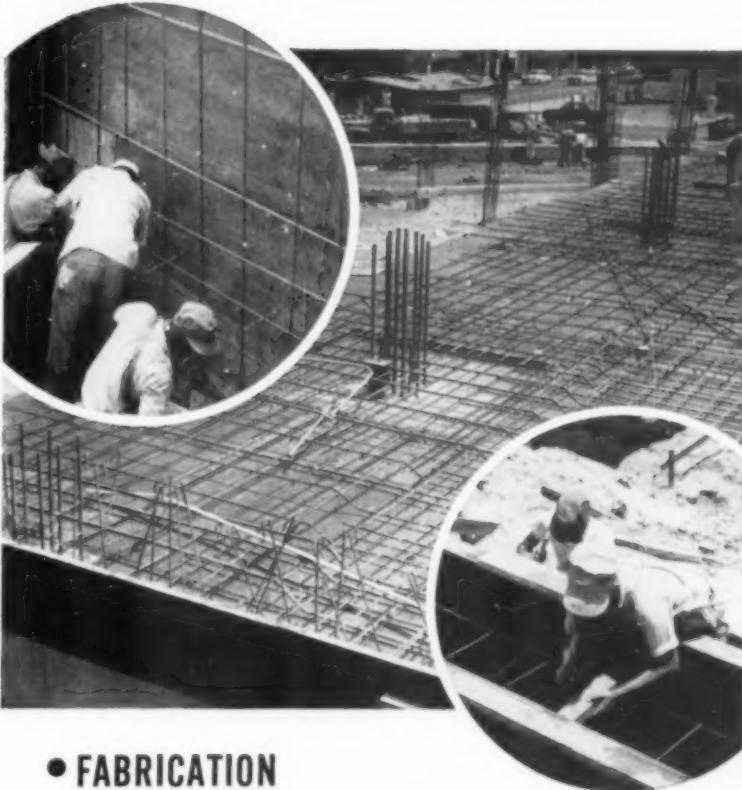
New catalog illustrates where to use Weldolet and Thredolet branch pipe fittings. Specific areas of application are shown with correct installation procedures. Describes complete range of stainless, alloy and non-ferrous fittings and Bonney's new marking standard. — Bonney Forge & Tool Works, 740 Meadow St., Allentown, Penna.

For More Free Data — Circle M-13
on the Handy Return Card — p 17

DIXISTEEL

TRADE MARK

• FABRICATED CONCRETE REINFORCING BARS



• FABRICATION THAT BUILDS SATISFACTION

Quick, accurate estimates . . . competent engineering aid—detailing and bills of material . . . rapid, dependable service . . . top quality steel and precision bending . . . are some of the reasons why more and more contractors and builders are turning to DIXISTEEL's Fabricating Division for mill-fabricated reinforcing bars, welded wire mesh and accessories. Call us in on your next job—little as it might be, big as you hope it will be—and see why it pays you to do business with Atlantic Steel.

TYPICAL JOBS USING DIXISTEEL FABRICATED REINFORCING BARS, WELDED WIRE MESH AND ACCESSORIES

- Industrial buildings
- Bridges—highway and railway
- Airports
- Commercial buildings
- Government buildings
- Driveways
- Swimming pools
- Schools

FABRICATING DIVISION
Atlantic Steel Company
ATLANTA, GEORGIA • EMERSON 3441

More Aids — Page 14

Equipment . . . Supplies . . . Methods

FOR FREE INFORMATION — Circle Code Number on Page 17 Return Card

Coal, Oil or Gas Burning Featured in Prototype Packaged Boiler Design

Late in November, Superior Combustion Industries, Inc., conducted a highly successful factory test of a new 12,500 lb/hr packaged water tube boiler designed primarily for coal firing and also equipped to utilize oil and gas.

New boiler is the prototype of a standardized design for future Navy shore installations requiring capacities from 10,000 to 25,000 lb/hr.

Unlike boilers erected at the site at costs varying up to \$7.64 per lb of steam capacity, the Superior Combustion prototype unit is designed for field assembly as a packaged unit,

thus reducing field labor and total cost. Equipment is arranged in three major packages:

1. Boiler base which is only 15" high as it sets under the boiler and in which is installed a continuous discharge oscillating spreader type stoker.

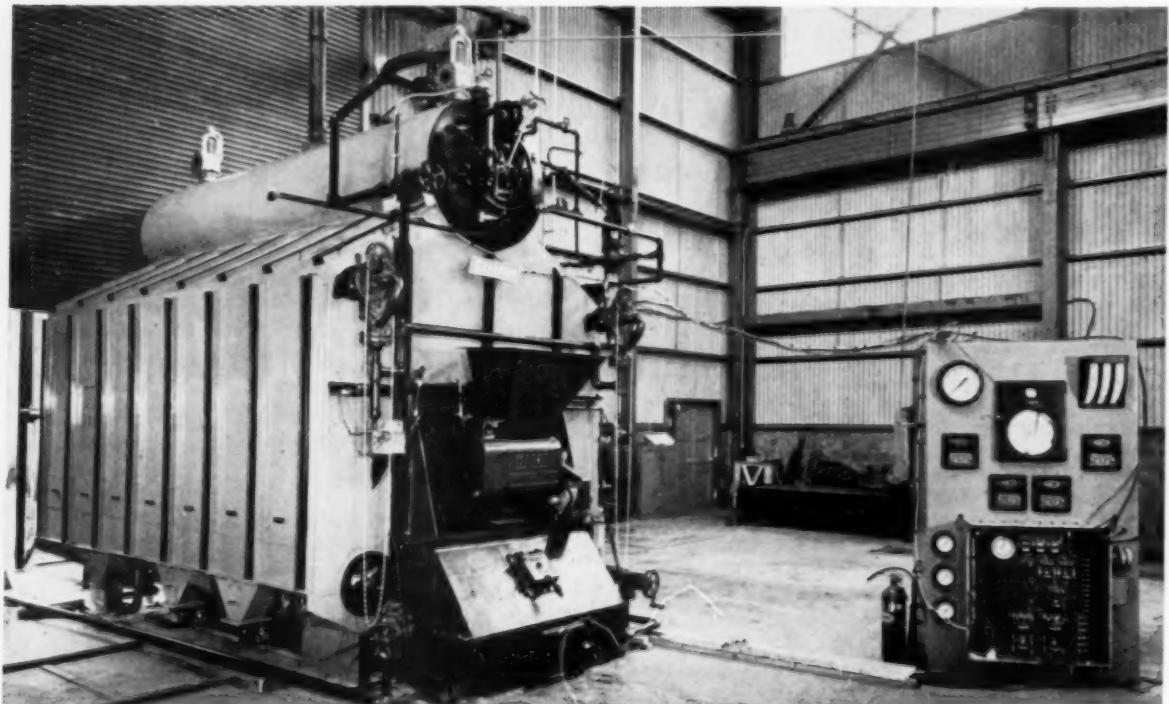
2. Completely plant assembled water tube "A" type packaged steam generator, which includes two gas passes within the furnace.

3. An assembled structural frame on which is mounted low draft loss dust collector, an induced draft fan, and a forced draft fan.

Design eliminates the high refractory base previously employed for small capacity packaged water tube oil or gas-fired steam generators when converted for coal firing. Stoker equipment by Riley Stoker Company, is of the continuous discharge, vibrating grate type. Boiler tube arrangement is of the basic A type. Ease of conversion from solid to liquid or gaseous fuels is a basic feature of the design and may be made in less than 60 hours.

Use of refractory or castable baffles has been eliminated by substituting chrome alloy steel. Design
(Continued on page 80)

For More Free Data — CIRCLE A-1
on the Handy Return Card — Page 17



Superior Combustion Industries' 12,500 lb/hr packaged prototype at the Wilkes-Barre, Penna., factory test. Boiler features and how it is designed to reduce purchase and erection costs for the Navy are described below. Since the Navy's requirements are essentially those of private industry, similar economies can be expected for industry.

Control panel at the right, supplied as a package, includes full metering type electrically operated controls assembled on the panel including a separate cabinet which provides full combustion safe guard protection for firing liquid and gaseous fuels.

WANTED:

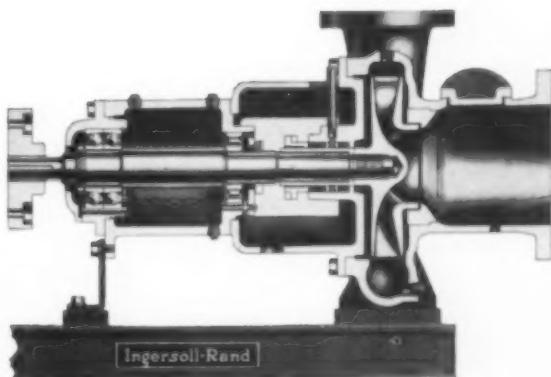
Your **TOUGHEST** Pumping Jobs!

Radically new type of centrifugal pump handles a variety of industrial liquids, even the most difficult, without clogging or air binding

Not just a modified centrifugal pump, the new Ingersoll-Rand Class EL, EM and EH Pumps feature a radically new and patented construction which makes them non-clogging, non-vapor-binding, self-venting and self-priming.

Foamy solutions containing up to 50 percent entrained air or gases can be pumped continuously without danger of losing prime or vapor binding. And viscous liquids or mixtures with exceptionally high solids content can be handled with equal ease—with complete freedom from clogging.

Crystals or other solids in suspension can be pumped without injury. And with any type of liquid, the pump will maintain its prime even when the suction piping is uncovered or exposed to the air.



Section through Class 6EH pump, showing the patented construction

These heretofore unattainable performance characteristics result from the unique *diverging* impeller design in which the area at the exit is much greater than at the inlet. Hence the material pumped cannot enter in sufficient quantity to replace the ejected liquid and a vacuum space is created between the blades. Unlike the ordinary centrifugal pump, conversion from velocity to pressure is accomplished in the impeller as well as the casing and the relative velocities are considerably lower. This reduces impeller wear when handling liquids with high solids content.

Field experience with the new EL, EM and EH pumps has conclusively proved their ability to handle the *toughest* pumping jobs. In actual service, they are pumping solutions that no other centrifugal pump could handle without air binding or clogging.

If you have a liquid moving problem that's too tough for an ordinary pump, this new I-R Pump offers a practical, low-cost solution. Sizes available for capacities from 200 to 7000 gpm, heads to 225 ft. For complete details, send today for your copy of Bulletin 7325.



Ingersoll-Rand

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10-302

PUMPS • COMPRESSORS • CONDENSERS • VACUUM EQUIPMENT • GAS & DIESEL ENGINES • ROCK DRILLS • AIR & ELECTRIC TOOLS

SOUTHERN POWER & INDUSTRY for JANUARY, 1956

Equipment, Supplies & Methods (Continued)

also provides for fuel re-injection and over-fire air systems on both side walls and through the bridge walls.

Boiler is supplied with a complete control panel including all piping and wiring necessary for fully automatic firing with coal, oil or gas; and changeover of controls is achieved simply by throwing switches. — SUPERIOR COMBUSTION INDUSTRIES, INC., Times Tower, Times Square, New York 36, N. Y.

A-Frame "Skyhook" Handles Two Tons

The Magic-Pole A-Frame is a practical, portable "skyhook" for supporting hoists at many places, indoors and out, where adequate means for bolstering the load are unavailable. The standard model handles 4000 lb, has a working height of 10 ft, yet weighs just 43 lb, complete with guy line.

Both legs fold together, then telescope to a length of 6½ ft, for easy storage and handling. Each leg extends to the required length by 6 in. steps. The guy line is included as standard equipment and may be secured to any convenient post, tree, pipe, truck, etc.

The adjustable leg length permits setup on ramps, sloping ground or



For More Free Data — CIRCLE A-2 on the Handy Return Card — Page 17

other difficult places without "digging in" the uphill leg.

A special screw in type "spike" at the base prevents slip and permits setups on concrete, wood block,

asphalt, soil or gravel. It is quite practical to mount in a truck bed for loading and unloading. Also the guy line can be lengthened or shortened, by which means loads can be shifted 3 ft and more.—B. E. WALLACE PRODUCTS CO., Exton 20, Penna.

Self-Vulcanizing Rubber Repair Material

"Rema" makes it possible to quickly repair bruises, tears and edge damage on conveyor belts without the use of heat or heavy vulcanizing equipment.

Since no curing time is required, belts may be returned to service as soon as repair work is completed. This greatly reduces loss of production time.

Vulcanization is a chemical process. Repaired area is sealed with an abrasive resistant cover stock patch. "Rema" is claimed to seal out moisture, reduce mildew, rot and deterioration, the great enemies of conveyor belts.



For More Free Data — CIRCLE A-3 on the Handy Return Card — Page 17

Any maintenance man can readily apply the materials. No particular skill is required. It can also be used to cover metal belt fasteners used to join conveyor belts.

New product is available in introductory kits or parts separately. — FLEXIBLE STEEL LACING COMPANY, 4625 Lexington St., Chicago 44, Ill.

KEEP UP-TO-DATE

See Pages 14-18

Gas-Operated Actuator for Remote Operations

The Robotarm, a new self-contained gas-operated double-acting actuator for remote operations of plug valves and similar mechanisms, is basically a diaphragm separating a large and small air chamber where the front chamber, being the larger, is used to act as an accumulator.

Check valves are built into the diaphragm assembly to pass air between the two chambers. A rod connected through the packing gland to the diaphragm extends from the larger chamber to operate necessary driving mechanism. For plug valve operation the connecting rod works a closed rack and gear assembly furnished to fit compactly over each type of valve.



For More Free Data — CIRCLE A-4
on the Handy Return Card — Page 17

Oxygen Cutting Machine

The new "Ultra-Graph," a precision oxygen cutting torch guide, is claimed to cut any design — even $\frac{1}{4}$ " holes, small slots — up to 40" per minute and to hold true tolerances of 1/64" automatically at high production rate.

Torch height is adjustable from base to 32" — takes any standard machine torch. Price ranges from \$315 to approximately \$545, being determined by the type of mounting and the size of machine.

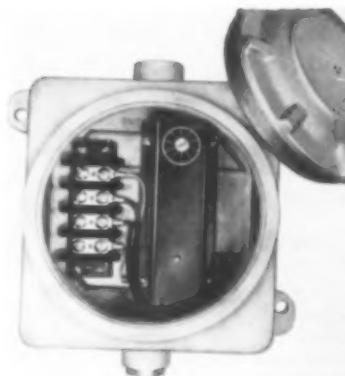
Largest machine in regular production cuts a 72" straight line; a 38" circle and an 84" semi-circle. Smallest one cuts a 60" straight line; a 29" circle and a 70" semi-circle.

Manufacture will soon be marketing a unit which will cut a 114" straight line, a 142" semi-circle and a 66" circle.

Instead of heavy electro-magnets on the tracing heads, the Ultra-Graph uses a light-weight Alnico permanent magnet which exerts a

To move the Robotarm forward, air or gas pressure is applied to the small chamber side, moving the diaphragm forward to an adjustable stop. This stop positions the forward stroke as desired and also trips open a check valve in the diaphragm allowing gas pressure to equalize into the large accumulator chamber.

If actuating pressure fails, the Robotarm will automatically return to its back position. Features of the new Robotarm are compact design allowing full access to plug valves for lubrication and packing gland adjustments. Only one gas operating line is required to open and close. Indicator arm allows visual check of plug valve opening position and easy installation in the field. — BETTIS CORPORATION, 320 South 66th St., Houston, Texas.



For More Free Data — CIRCLE A-5
on the Handy Return Card — Page 17

warning, or causing a shutdown the instant a malfunction develops.

The Explosion Proof Vibration Monitor may be provided with either a SPDT or a DPST normally open switch. An adjustment provides for a wide range of normal vibration levels. Electrical rating is 5 amperes, at 115 or 230 volts a-c resistive or inductive.

Aluminum explosion proof housing is designed for Class I, Group D, Class II, Groups E, F, and G, and Class III locations. Also available in weatherproof housing with external reset operator and locking means. — THE BETA CORPORATION, Richmond, Va.

Vibration Monitor

Explosion proof vibration monitor will detect mechanical malfunctions such as failing bearings or unbalance. Applications include gas engines, pump motors, large fans and blowers, etc.

The unit offers valuable supervisory protection for infrequently attended equipment by actuating a

force of from 3 to 12 lb against the template. Exceptional accuracy

For More Free Data — CIRCLE A-6
on the Handy Return Card — Page 17

has been insured by mounting the template follower in the same center-line as the cutting orifice in the torch head. — HEATH ENGINEERING CO., Fort Collins, Colo.

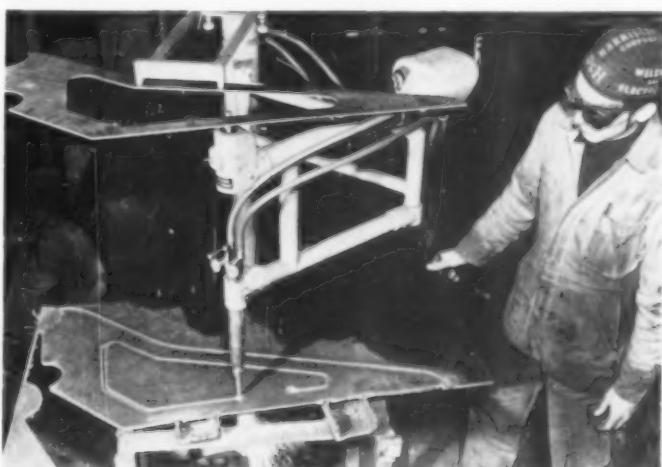


Plate being cut by Ultra-Graph is tack welded at front end only. No distortion is experienced in cutting. Note that tracing head is in same center-line as torch.

Equipment, Supplies & Methods (Continued)

One-Coat Insulating & Finishing Cement

Many power and plant engineers are saving both time and materials in insulating ductwork, fan housings, pipe fittings and other heated equipment by applying white mineral wool cement that both insulates and finishes in one coat.

As illustrated, one $\frac{1}{2}$ -in. layer of the White Super Powerhouse Cement is applied over mineral wool block and reinforced by wire mesh. This is in sharp contrast to the conventional method which calls for the application of one coat of insulating cement, an additional layer of wire mesh and two coats of finishing cement.

The dual-purpose cement, which dries without shrinkage cracks, provides as attractive a finished appearance as attained by more laborious



For More Free Data — CIRCLE A-7
on the Handy Return Card — Page 17

methods. In addition to the substantial application savings realized, the material has a thermal efficiency comparable to that of conventional insulating and finishing cement combinations.—BALDWIN-HILL COMPANY, Trenton, N. J.

Hydro-Electric One-Man Work Tower

New Safway Moto-Lift one-man work tower plugs into any 110 volt a-c outlet. Platform (30 x 30") can be raised to 17 ft in 25 sec. This permits reaching work at 22-23 ft. Towers are easily rolled to follow progressive work or get into and away from maintenance jobs without delay.

The plug-in tower is being offered in addition to battery and hand-operated models, on the market for several years.

The new plug-in tower is provided with 50 ft of heavy duty extension cable, permitting work along a 100 ft strip before moving to another outlet. Battery and hand operated models are self contained and can be used anywhere.

Pressing a foot button on the platform controls elevation of both the plug-in and battery operated towers. The hand operated Hydro-Lift is raised by reciprocating a hand lever on the hydraulic pump. All models are lowered by stepping on a hydraulic release valve.

This equipment is engineered to meet specifications of the National Safety Code. Guard rails are 40 in. high. Positive protection is provided

install
peak performance
into your
compressors (AIR • GAS • AMMONIA)



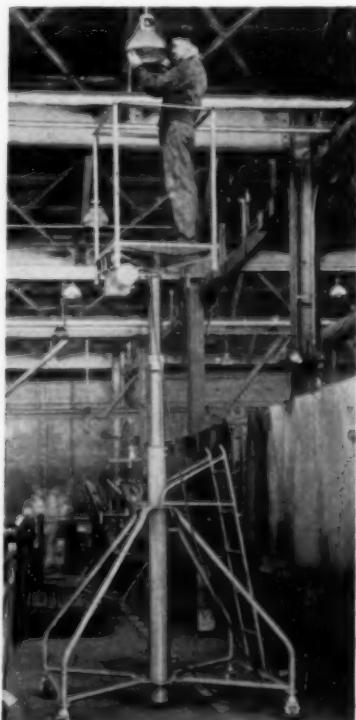
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- ✓ normal discharge temperature
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Our detailed proposal for increasing the efficiency of your compressor will be sent you without obligation. Send us the name, bore, stroke, and speed of your machine.

VOSS VALVES / J. H. H. VOSS Co., Inc. 784 East 144th Street, New York 54, N. Y.

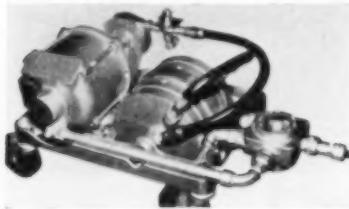


For More Free Data — CIRCLE A-8
on the Handy Return Card — Page 17

against accidental lowering of the platform — even in the event of complete hydraulic failure, a mechanical brake will instantly lock the telescoping support tubes in position.—SAFWAY STEEL PRODUCTS, INC., 6234 W. State St., Milwaukee 13, Wis.

Hot Spray Heater for Outdoor Maintenance

The Spee-Flo Hot Spray Portable 600 is a heavy duty field unit designed to operate in chemical plants, oil fields, refineries, shipyards, steel mills and wherever protective coatings are applied.



For More Free Data — CIRCLE A-9
on the Handy Return Card — Page 17

The Portable 600 brings the advantages of heated application into outdoor maintenance work for use with all types of sprayable coatings. Vinyls, enamel, cutback asphaltums and similar materials may be hot sprayed to produce a smoother, denser, less porous film which is free of pinholing and imperfections.

Hot spray application with the Spee-Flo 600 is faster, as one coat replaces two or more coats of cold application. Maintenance departments can now enjoy an average estimated labor saving of approximately 35% in square foot coverage, with the assurance of a better job free of runs and sags. Coverage on hard-to-cover colors such as white or red can be accomplished in a single coat.

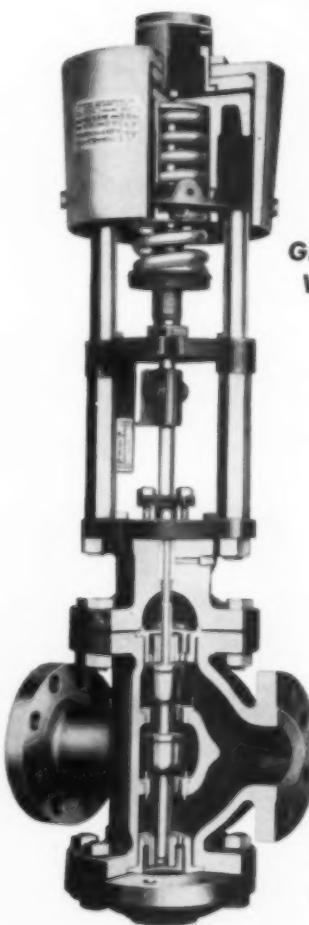
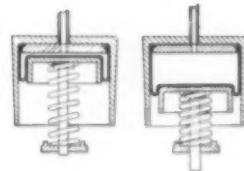
The Spee-Flo portable (Model 600C-PE) operates with the standard pressure tank or pump and may be elevated on a scaffold or operated at ground level. Its heavy duty, 2000 watt, UL approved heater and explosion-proof motor will maintain hot material at the spray gun at a capacity of 15 gph and for distances up to 50 ft from the heater, for wide mobility. Special insulated hose for extremely cold weather conditions is available.—THE SPEE-FLO COMPANY, 720 Polk Avenue, Houston, Texas.

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CONTROL VALVE with **ISOFORCE** actuator

GIVES YOU MORE POWER
WHEN YOU NEED IT ...



... with the Foster Bellofram construction, no force is lost at end of the stroke where spring compression requires the maximum force. This assures linearity of instrument and stem positions. These new control valves are available in sizes starting at $\frac{1}{2}$ " with materials and end connections to suit operating conditions.

For complete technical information, ask for Bulletin CV-1



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C. B. Rogers & Associates, 1000 Peachtree St., N. E., Atlanta 5, Ga.; L. R. Ward Co., 2009-11 Canton St., Dallas 26, Texas; 1814 Texas Ave., Houston 2, Texas; Ransom, Wallace & Co., 116½ E. Fourth St., Charlotte 2, N. C.

Equipment, Supplies & Methods (Continued)

Gasketing at 300 F

A tight sealing gasketing material known as Garlock 662 and developed primarily for use in the oil and chemical processing industries has been approved by Underwriters' Laboratories for use in equipment where harmful liquids are encountered.

Garlock 662 is a cork base paper impregnated with Chemigum Latex, a water, oil and gasoline-resistant latex made by the Chemical division of the Goodyear Tire and Rubber Company.

Chemigum Latex permits use of gasketing at temperatures as high as 300 F, whereas the maximum for ordinary vegetable fiber gasketing is 212 F.

The latex binder is not susceptible

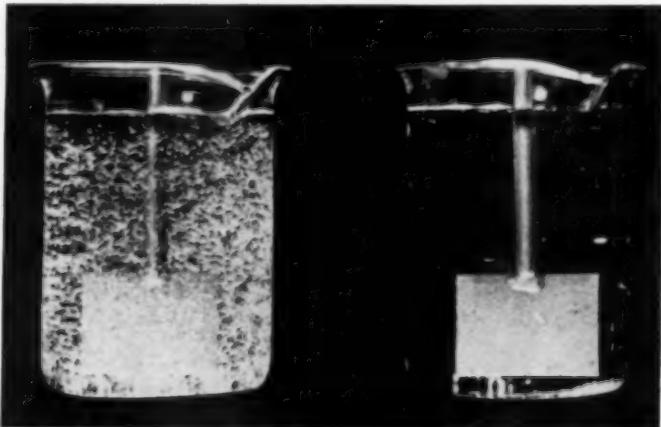
to changes in moisture content, thus eliminating shrinkage which is a critical problem in ordinary gasketing using a glue binder, or with cork paper without latex impregnation.

Elimination of shrinkage allows users to cut their own gaskets from Garlock 662 sheets far in advance of actual needs. Storage is no problem since the Chemigum Latex impregnation gives superior resistance to humidity, high temperatures and aging.

Primary use for the gasketing is in compressors, oil and water pumps and processing equipment found in the oil and chemical processing industries.

Garlock 662 sheets or cut gaskets are made in thicknesses from .01 to .25 of an inch. Cut gaskets are available in a variety of shapes and sizes with outside dimensions up to 48 in.—THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

For More Free Data — CIRCLE A-10
on the Handy Return Card — Page 17



New Nalco 600, coagulant-coagulant aid, demonstrates exceptionally fast floc formation and settling. Beaker at left contains turbid water treated with alum alone. Beaker at right contains water of equivalent turbidity, but treated with a reduced dosage of alum and Nalco 600.

Turbid Water Coagulant for Industrial & Cooling Use

A new low-cost, low-dosage coagulant and coagulant-aid, Nalco 600—a polyelectrolyte—shows exceptional promise in coagulating turbid river and surface waters for industrial and cooling use.

Nalco 600 will effect excellent coagulation in many cases where presently available treatments are ineffective and where iron and alumina floc carry-over is a problem.

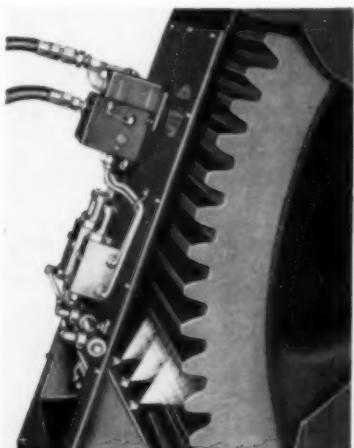
The coagulant is also recommended for waste water treatment as well as for paper mill treatment of water for general service and for settling in seavealls.

A clear, liquid, alkaline and non-corrosive to steel, Nalco 600 has proved useful, too, in lime-soda plants and processes.—NATIONAL ALUMINATE CORPORATION, 6216 West 66th Place, Chicago 38, Ill.

For More Free Data — CIRCLE A-11
on the Handy Return Card — Page 17

**Spray Panel
Lubricates Gears**

"Spray Valve Panels" are designed to spray-lubricate bull gears, girth gears such as on grinding mills and kilns, and other spur or herringbone gear trains.



Spray panel mounted on gear housing demonstrates the sound mechanical approach for spraying lubricant on the pressure side of the gear teeth. The principle shown here is applicable to both the hand-operated and automatically-controlled types of panels.

For More Free Data — CIRCLE A-12
on the Handy Return Card — Page 17

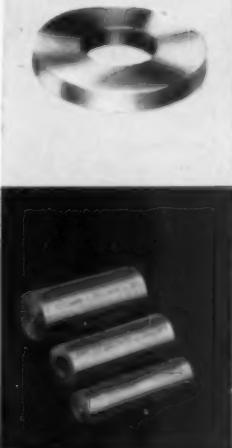
The self-contained panels are fastened to gear housings or framework and spray the lubricant directly to the pressure side of the gear teeth. Measuring approximately 2 ft by 3 ft, the panels feature stainless steel spray valves having built-in nozzles. Central pumping units deliver gear lubricant at regular intervals through a circuit of Dualine measuring valves. The measuring valves distribute the lubricant under pressure to the spray valves where it is mixed with air to form a penetrating spray. — THE FARVAL CORPORATION, 3249 East 80th Street, Cleveland 4, Ohio.

Self-Cleaning Spray Nozzle

Spray nozzle for central system air conditioners will not clog regardless of the amount of lint or other fine foreign matter in the air.

Employing orifices of special design and flexible material, the new nozzles "spit out" all obstructions impeding the flow of water to be atomized. They are particularly applicable for textile and tobacco

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Equipment, Supplies & Methods (Continued)

plants or any operation where nozzle plugging is a problem.

The new spray nozzles, trademarked "Cant-Clog," will become standard equipment in all new Carrier spray type air conditioners. Available in conventional sizes, they can be used to replace existing nozzles in a wide variety of air conditioning equipment.

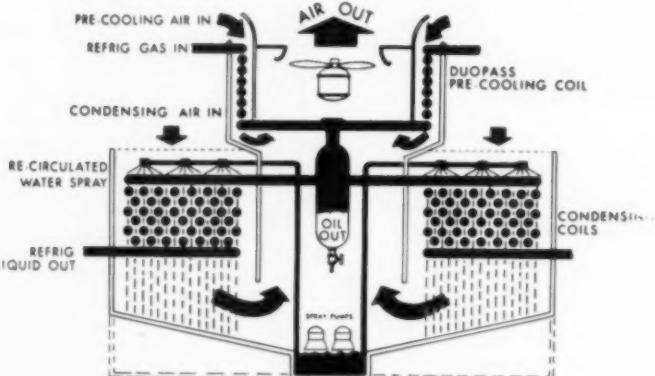
If lint or other foreign material is caught behind the orifice, pressure from the water immediately builds up within the nozzle forcing the diaphragm to stretch, enlarging the orifice. In the expanded position,

the restrictive particles are easily expelled.

The new product has just undergone a rigorous year-long performance test in the central conditioning apparatus in a Southern textile mill, where quantities of airborne lint were particularly heavy.

To make the test even more severe the screens normally used to help protect nozzles from becoming choked were removed. During this period the system has operated without a single nozzle becoming plugged. The old types of nozzles had to be cleaned every two weeks even when the protecting screens were used. — CARRIER CORPORATION, Syracuse, N. Y.

For More Free Data — CIRCLE A-13
on the Handy Return Card — Page 17



Evaporative-Type Refrigerant Condenser

In a radically new design (capacities ranging up to 240-ton ammonia refrigeration) the refrigerant is condensed in two parallel mounted coils enclosing a central plenum under the fan section. Water sprays are arranged over the coils and the air enters from above, travels downward and changes direction to enter the plenum, at which point the entrained water is eliminated. The air then moves up and out thru propeller fans.

The hot gas is sub-cooled before condensation by first passing thru duo-pass pre-cooling coils mounted beside the fan section. A dry air stream crosses this coil, removing the super-heat. Any oil vapor present is liquefied during this process and removed by the "Oilout" separator in the gas line ahead of the condensing coils. This pre-cooling also prevents the high-temperature deposit of hard scale on the condens-

ing coils. The only water consumed is that evaporated. Unrestricted down-draft air instantly removes the excess water from the condensing coils, improving the heat transfer from the refrigerant gas to the air stream. The excess water is recirculated.

All sections of the Condenser are encased in separately removable panels for complete accessibility for painting or to allow the coils to be cleaned from any side. Removing a single panel gives entrance to the central plenum and puts all interior parts within reach.

There are four sizes: 90, 120, 180 and 240 tons. The ratings are for ammonia; the condensers are also applicable to freon. The dimensions of the largest size are approximately: length 13 ft, width 16 ft, height 10½ ft. — NIAGARA BLOWER COMPANY, 405 Lexington Ave., New York 17, N. Y.

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on the Handy Return Card — Page 17

Progress highlights . . .

LIQUID METAL Fuel Reactor

LIQUID METAL as fuel is believed to be technically feasible in the near future and gives promise of being economically attractive, a group of 14 industrial and 3 other organizations has reported to the AEC's Brookhaven National Laboratory.

The group, organized and administered by The Babcock & Wilcox Company, based its study on the liquid metal fuel reactor concept pioneered by Brookhaven scientists and engineers. The group estimated that a full scale plant with an electrical capacity of 226,000 kw could be built and operated for a **cost of 7.1 mills per kwh**. This cost is lower than those for large conventional fuel plants in areas of the U. S. where fuel costs are high. If four reactors were built at the same location for a total electrical capacity of 905,000 kw this cost would be lowered to 6.5 mills since initial and operating costs do not go up in direct proportion to added capacity.

The group was organized late last year to explore the economic and technical feasibility of the Liquid

Metal Fuel Reactor (LMFR) system developed at Brookhaven. The group was to survey and evaluate the work already done by Brookhaven and to recommend a future program of research. Babcock & Wilcox provided over-all administration and supervision of the fifty scientists and engineers engaged in the study. About 20 of these were B&W employees.

Organizations providing either full-time or consulting specialists in addition to engineers and physicists provided by Babcock & Wilcox were: Air Reduction Co., American Gas and Electric Co., American Smelting and Refining Co., The Bailey Meter Co., Bechtel Corp., Carbide & Carbon Chemical Co., The Detroit Edison Co., Dow Chemical Co., The Ethyl Corp., The International Nickel Co., Inc., Merck & Co., Inc., National Carbon Co., The AEC's Oak Ridge National Laboratory, Rensselaer Polytechnic Institute, Tennessee Valley Authority, and Vanadium Corp. of America. American Gas and Electric and Bechtel participated as representatives of the Nuclear Power Group and The Detroit Edison Co.

participated as a representative of the Atomic Power Developments Associates.

First Use of Liquid

The LMFR system is capable of generating electric power, producing new fuel for itself, and delivering by-products to waste tanks, all in continuous processes. The fuel would be in liquid form, instead of in solid form as in most reactors, and would circulate within the system. This would be the first usage of a liquid metal alloy, in this case uranium-bismuth, as the basic fuel.

Conclusions of Report

In order to pinpoint technical problems which must be solved before a large plant can be built, it was necessary for the group to develop a full-scale preliminary design of the LMFR system. Conclusions contained in the report are based on this reference design, but it was emphasized that improvements can be expected when further mechanical design and chemical processing studies are completed.

One of the most attractive features of the system, according to the report, is its flexibility. It can function as a regenerative or as a non-regenerative reactor and, in either case, over a wide range of power outputs. It will also employ complete, continuous chemical processing of both core and blanket materials on the site and can be connected to the most modern turbines, two features which are not found in most other reactor systems.

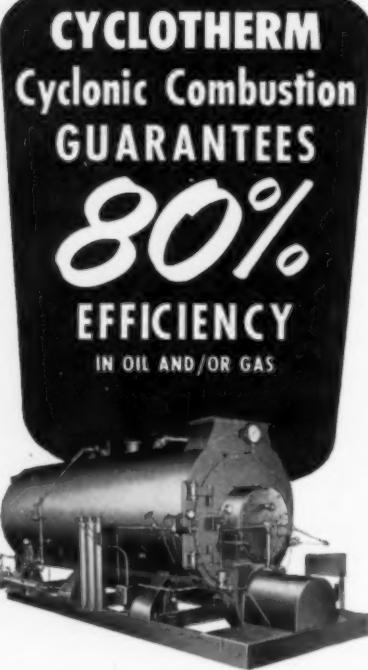
General Electric and the South

General Electric is one of the South's most active industrial citizens. The company during the past ten years has invested about \$250 million in 19 new plants in 10 Southern States.

Here are the Southern locations where G-E has established plants during the past decade, products manufactured, and number of persons employed, or anticipated to be employed when the newer plants reach full production:

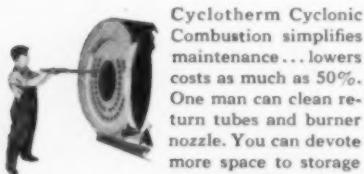
City	Product	Employees
Jonesboro, Arkansas	Specialty component motors	525
Anniston, Alabama	Electronic tubes	1,650
Rome, Georgia	Medium power transformers	1,777
Lexington, Kentucky	Sealed beam headlamps	350
Lexington, Kentucky	Lamp glass	144
Louisville, Kentucky	Major appliances	12,000
Owensboro, Kentucky	Receiving tubes	4,700
Jackson, Mississippi	Fluorescent Lamps	320
Asheboro, North Carolina	Automatic blankets	350
Goldsboro, N. C.	Parts for lamps and radio tubes	150
*Hendersonville, N. C.	Outdoor lighting	600
*Hickory, N. C.	Distribution transformers	1,100
*Irmo, South Carolina	Aluminum electrolytic capacitors	700
Memphis, Tennessee	Christmas and miniature lamps	500
Houston, Texas	Switchboards, panelboards, etc.	90
*Tyler, Texas	Home air conditioning	1,100
*Lynchburg, Virginia	Rectifiers	800
*Roanoke, Virginia	Industrial controls	1,800
Waynesboro, Virginia	Electronic controls	700

(NOTE: *—under construction)



Cyclotherm Steam and Hot Water Generators
18 to 500 hp.
15 to 200 psi.

Cyclotherm Cyclonic Combustion achieves its high heat transfer rate in only 2 passes. Gives you 66% more steam generating power per sq. ft.! Fuel consumption varies with load requirements. From cold start to full power takes only 15 to 20 minutes. Fuel changeover can be quickly made as fuel prices fluctuate.



Cyclotherm is up to $\frac{1}{3}$ smaller than other packaged units. Time-saving, economical installation requires 5 connections.

Write today for the free booklet which proves how Cyclotherm can produce steam at lower costs... in minimum space.

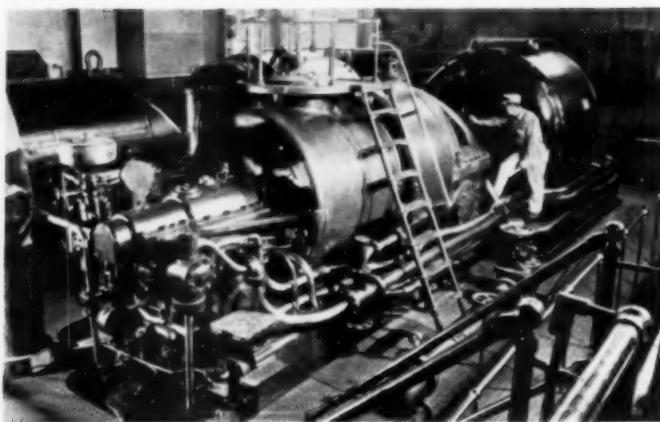


**YEARS AHEAD
IN STEAM
GENERATION**
CYCLOTHERM
Steam & Hot Water Generators

Cyclotherm Division
National-U. S. Radiator Corp.,
2225 E. First Street,
Oswego, New York

News for the South & Southwest (Continued)

Starts on Page 8



Virginia Electric & Power Retires Veteran Turbine

Retired after 47 years of service by the **Virginia Electric & Power Co.**, Richmond, is this pioneer 3250-kw **Allis-Chalmers** steam turbine-generator.

Although it was built but a few years after Allis-Chalmers entered the steam turbine field, the unit dubbed "General Lee" by its operators, was significant as the highest rated 1800-rpm machine in the U. S. in 1908.

The veteran turbine has delivered as high as 5500 kw for several hours in the course of many years on peak evening load duty. When inspected three years ago, the unit was found in good condition and it was still in good operating condition at its retirement. Maintenance costs on the machine were extremely low, with 47 years of replacements listed on one-half of a repair index card.

Leslie Co. Promotions

Russell W. Boettiger has been appointed Director of Sales for Leslie Co., Lyndhurst, N. J.; **Sten Soderberg** is now Director of Engineering; and **Alfred A. Fuhr** has been promoted to the position of Director of Manufacturing.

Mr. Boettiger, a graduate of Cornell, started with Leslie in 1936 as a technical engineer and rose to Planning Engineer, Chief Planning Engineer and in 1945 to Sales Manager.

Mr. Soderberg will direct the firm's expanding research, development and engineering operations. Educated in Sweden, he joined Leslie in 1926 to become the firm's Chief Engineer. He is a member of the Leslie Co. Board of Directors and holds a number of patents in the automatic controls field.

Mr. Fuhr will direct all of the firm's manufacturing operations of steam, air and liquid pressure regulation equipment and steam and air whistles used aboard ship, for railroad, and for air raid signals. Mr. Fuhr attended Columbia and joined Leslie in 1934. In 1937, he became Chief Draftsman, rising to the position of Plant Manager in 1944.

Trane Company — Ok. City

The Trane Company, La Crosse (Wis.) manufacturer of air conditioning, heating, ventilating and heat transfer equipment, has announced the appointment of **William L. Mullins** to its **Oklahoma City** sales office. Mullins has previously been associated with the Trane office at Memphis.

Norton Company — Southeast

Robert H. Johnson, formerly Norton Company Abrasive Engineer in Eastern Iowa has been assigned to a new sales territory consisting of Florida and the southern portions of Georgia and Alabama.



Mr. Johnson has been with Norton Company since 1941 and has been an abrasive engineer since 1953.

Leonard Now A-C Chf. Engr. at Gadsden Transformer Works

E. M. Leonard, who had been engineer in charge of distribution transformer design at Allis-Chalmers Pittsburgh Works, has been promoted to chief engineer, transformer section, Gadsden (Alabama) Works, where new transformer manufacturing facilities were recently placed in operation.



Leonard was employed by the Pittsburgh Transformer Co. for four years when Allis-Chalmers acquired the firm in 1927. He has been associated with the Pittsburgh Works since that time.

Leonard is a member of the American Institute of Electrical Engineers and a graduate of Pennsylvania State College.

NO OTHER VALVE IN THE WORLD LOOKS LIKE THIS WHEN YOU REMOVE THE BONNET



FAIRBANKS® RENEWABLE SEAT RING GATE VALVE

Never has to be removed from the line to replace the seat rings. For the first time in valve history, you can replace the seat rings in a renewable seat ring gate valve, under all normal conditions, in less than 10 minutes, using just a screw-driver, and with the valve body still installed in the line. It is simply a matter of removing the bonnet (easily accomplished with the Fairbanks two piece union bonnet construction) loosen the stainless steel retaining screws and lift out the monel seat rings from the body. The new seat rings slip into place and are positively secured again with the retaining screws.

Fairbanks new 200 pound steam working pressure gate valves, available in sizes $\frac{1}{2}$ " through 2" in the rising and non-rising stem construction, have been field tested for over two years under all conditions from steam to corrosive liquids and have proven completely satisfactory—absolutely dependable. Seat rings have been replaced in from 7 to 10 minutes from the time steam was shut off until it was turned on again. In several instances, it was reported that the replacement was performed in just 4 minutes.

This new patented valve design is typical of the sound engineering and outstanding values found in Fairbanks complete line of Bronze and Iron Body Valves.

YOURS ON REQUEST: Illustrated, descriptive folder gives complete information on Fairbanks Renewable Seat Ring Gate Valve, with details and specifications. Yours without charge. Write today.

THE ® **Fairbanks** COMPANY

393 Lafayette Street, New York 3, New York
Branches: New York 3 • Boston 10 • Pittsburgh 22 • Rome, Ga.
Valves • Trucks • Casters • Wheels • Dart & "PIC" Unions



1 | Retaining screw loosened with ordinary screwdriver.



2 | Finger hooks inside seat ring. Seat ring lifted out of valve body.



3 | New seat ring is inserted. Retaining screw tightened.



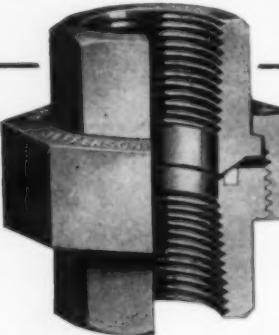
4 | Bonnet replaced on valve body.

Specify and Use

jefferson

A-4 PIPE UNIONS

*because installation
and maintenance
costs are LESS*



The outstanding features in Jefferson Union materials and construction which assure definite savings and increase their utility and savings are:

. . . use of air furnace malleable iron of 55,000 lbs. p.s.i. providing maximum strength.

. . . material and design such as to make it possible to recommend and guarantee their use for 500 lbs. p.s.i. steam and oil at 350° F., or 2,000 lbs. p.s.i. non-shock cold W.O.G. in sizes from $\frac{1}{2}$ " to 2".

. . . accurately GROUND seats . . . not just merely machine-finished.

. . . seat rings cut from SPECIAL DRAWN BRASS TUBING. (All-iron seats also available.)

. . . utmost protection in use through rigid testing and inspection.

These and other features have provided the reasons why Jefferson Unions are Underwriters' Laboratories approved and recognized for their inherent high quality, strength and long service life . . . qualities which in many services enable them to replace higher priced steel unions. All of which add up to real, time-proved reasons to standardize on Jefferson Unions in your plant.

Let Jefferson supply your requirements also in 90° and 45° Union Elbows, Union Tees and Flange Unions. The complete line includes 150#, 250# and 300# unions and union fittings. Full details on request.

Contact us or your nearest distributor for your needs.

**JEFFERSON
UNION CO.**

45 Fletcher Ave.,
Lexington 73, Mass.

**Every installation
means another
Satisfied User**

News for the South & Southwest (Continued)

Speedy Communications in Florida Nylon Plant

R. C. Gessert, manager of Western Union's Pensacola office, explains to F. G. Gronemeyer, Chemstrand plant manager, Western Union's Intra-Fax Facsimile communications system for use in The Chemstrand Corporation's quality control program at its nylon manufacturing facilities at Pensacola, Florida.



Western Union engineers are presently making additional installations of the modern written record communications system. The equipment is being used for a rapid transmission of chemical analysis data from the central laboratory to various control rooms located throughout the plant area. It is capable of reproducing typewritten messages, hand-written messages and sketches.

Improved accuracy and speed of transmission of data to operating areas are part of a planned quality control program.

Air Reduction — Louisiana

W. M. Champion has been appointed district manager of Air Reduction's Shreveport, Louisiana sales office.

Mr. Champion, replacing John Lund who left the company, has been with Airco since 1946, serving

in various sales capacities at the Oklahoma City office. Since July, 1954, he held the position of assistant sales manager there.

Air Reduction Sales Company, a division of Air Reduction Company, Incorporated, is a major producer of industrial gases, arc welding and oxyacetylene cutting and welding equipment.

Florida Electrical Conference for Pulp & Paper Industry

The American Institute of Electrical Engineers' Conference on Electrical Engineering as applied to the Paper and Pulp Industry has been scheduled for March 8 and 9, 1956 at the University of Florida in Gainesville.

The Conference will be jointly sponsored by the AIEE sub committee, the Jacksonville, Florida Section of AIEE, and the College of Engineering of the University of Florida.

Ten important papers, dealing with subjects of interest to all persons associated with the paper and pulp industry, will be presented during the three sessions of the two-day Conference. Among the subjects to be discussed are: the use of atomic energy in industrial plants; the use of television in the paper and pulp industry; problems in adaptation of electrical engineering to the paper industry; and conduit problems and their solutions in paper mills.

Open forum discussion periods have been arranged at each session, and the Conference program will be concluded with an inspection trip of the University of Florida's paper and pulp department.

Presiding at the first session of the Conference will be S. A. Bobe of Westinghouse Electric Corporation, Atlanta, Georgia, who is chairman of the AIEE subcommittee on paper and pulp industry. H. M. Reed, Jr. of International Paper Company, Mobile, Alabama, will preside at the second session, while E. K. Murphy of Rayonier, Inc., New York, New York, will preside at the third session. The welcoming address at the Conference will be given by Dean Joseph Weil of the University of Florida's College of Engineering.

7th Plant Maintenance & Engineering Conference

A group of 45 outstanding experts, drawn from all types of industries, will lead the discussions at the **7th Plant Maintenance & Engineering Conference** which opens in Convention Hall, Philadelphia, Jan. 23.

The conference will extend for three days, while the Plant Maintenance & Engineering Show will run for an additional day. Clapp & Poliak, Inc., New York exposition management firm, produces both events.

The show, which is being held in the East for the first time since 1952, is one of the largest annual industrial expositions in the country. More than 20,000 executives are expected to attend the show. The conference, which usually attracts about 2,500 engineers, is the largest of its kind.

Most conference sessions are general in nature and cover all types of industries. However, five industries will receive special attention with separate sessions devoted to each. These include air transport, chemical, petroleum refining, paper mill and paper product, and textile.

Among new topics scheduled this year are "Yardsticks to Measure the Effectiveness of Maintenance," "Equipment Replacement Policies," "Design and Operation of Maintenance Shops," "Maintenance of Machine Tools," "Report Writing," "Relationship of Maintenance and Purchasing Departments," "Insuring Effective Utilities for the Plant," and "Making the Maintenance Personnel Control-Minded."

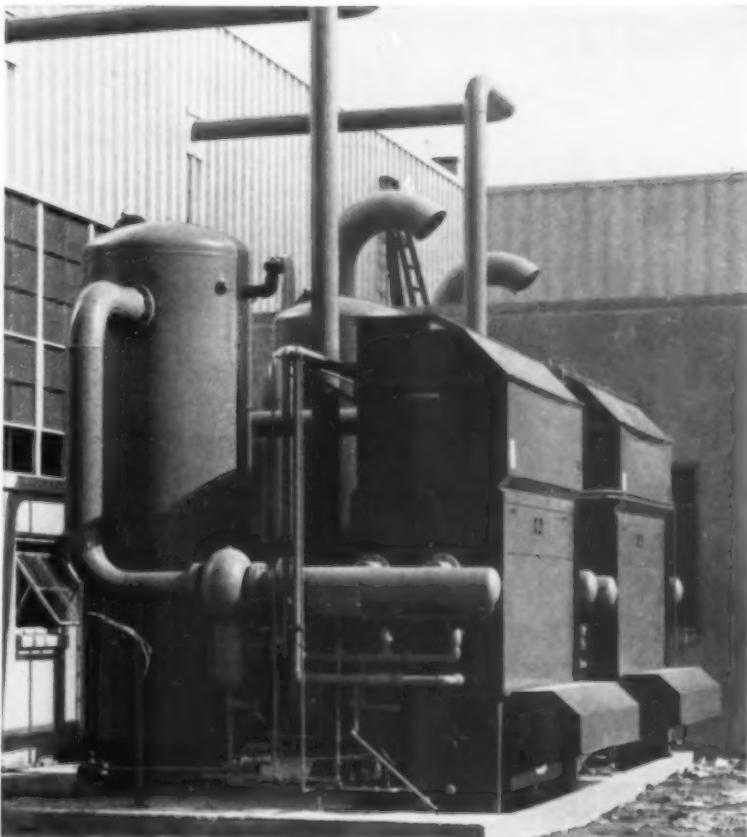
Southwestern Repr. for Petro-Chem Development

The appointment of Rawson & Co. of Houston, Texas and Wm. H. Mason Co. of Tulsa, Oklahoma, is announced by the Petro-Chem Development Co. of New York City.

Rawson & Co. will serve all of Texas with the exception of the Panhandle area, all of Louisiana, and southern Arkansas.

Wm. H. Mason Company will serve all of Oklahoma, the Panhandle area of Texas, northern Arkansas and Kansas City, Mo.

Petro-Chem Development Company are the designers and builders of the well-known Iso-Flow Heaters which are used extensively throughout the oil refinery, petrochemical and chemical industries.



This Niagara Aero After Cooler also cools compressor jacket and intercooler water.

COMPRESSED AIR...Lower in Cost Dependably Drier and Cooler Trustworthy for Instrument Use

THE NIAGARA AERO AFTER COOLER offers a completely self-contained method replacing both shell-and-tube cooler and cooling tower. It is independent of a large supply of cooling water and consistently reduces compressed air temperatures to below ambient. Its drier air gives you a better operation and lower costs in the use of all air-operated automatic instruments, tools and machines, paint spraying, sand blasting and moisture-free air cleaning.

Direct saving in the cost of cooling water saves the price of the Niagara Aero After Cooler in less than two years. Water saving also means less expense for piping, pumping, water treatment and water disposal, or you get the use of water elsewhere in your plant where it may be badly needed.

Niagara Aero After Cooler assures all these benefits because it cools compressed air or gas below the temperature of the surrounding atmosphere; there can be no further condensation in your air lines. It condenses the moisture by passing the air thru a coil on the surface of which water is evaporated, transferring the heat to the atmosphere. It is installed outdoors, protected from freezing in winter, proven in service on the largest plant utility air systems.

Write for complete information; ask for Bulletin No. 130

NIAGARA BLOWER COMPANY

Over 35 Years of Service in Industrial Air Engineering

Dept. S. P., 405 Lexington Ave.

New York 17, N. Y.

District Engineers in Principal Cities

Bring the Sun Indoors!



Your Plant can now have
EFFICIENT, HEALTHFUL HEAT
silent and draft-free
with
PANELBLOC
INFRA-RED UNIT HEATERS

- Comfortably heats workers and machines within radiation area.
- Heat not wasted on air which would normally rise to ceiling.
- No fan, motor or electrical connection needed.
- Never shut down due to power failure.
- Heat delivery cannot be deflected by drafts from open doors or windows.
- No moving parts . . . less maintenance.
- May be used with any commercial type gas fuel.

Remember how comfortable it feels to stand in the warm sun on a cold day? That's how Panelblocs work. Gentle, comfortable heat rays warm everything they touch. You have all the advantages of conventional heaters . . . none of the disadvantages.

Panelbloc uses no fan. This means no drafts (heating is accomplished by guided radiation). With no electrical connections, Panelbloc costs less to install—will continue to operate during a power failure . . . and it heats, not air, but personnel and equipment . . . anything solid.

Panelbloc may be installed in practically any type structure for general heating; for spot heating in an otherwise unheated building; for heating a single room . . . In fact, almost any heating requirement can be solved with Panelbloc. Available in two models: 62,500 btu and 125,000 btu input.

For warm air heating check the Prat-Daniel THERMOBLOC Heater . . . used the world over.

THERMOBLOC

Division of

**PRAT-DANIEL
CORPORATION**

4-12 Meadow St. • South Norwalk, Conn.

Send Me Panelbloc Bulletin P-154
 Name _____ Title _____
 Company _____
 Address _____

News for the South

Cleaver-Brooks Repr. for North Central Texas

Erickson Industrial Products Company, 6234 Peeler Street, Dallas 19, Texas, has been appointed Cleaver-Brooks representative in the Dallas industrial marketing area for the sale of Cleaver-Brooks boiler equipment.



A. J. Erickson

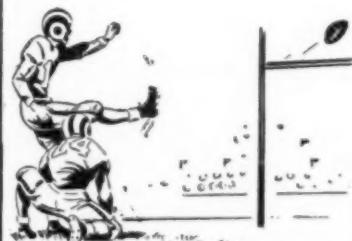
The new company is under the ownership of Mr. A. J. Erickson, who was formerly with Combustion Control Corporation as district manager of the Southwest area. The territory served by the new company will include 58 counties in North Central Texas.

Cleaver-Brooks Company manufactures oil, gas and combination gas/oil fired stationary boilers, mobile steam boilers, evaporators, distillation equipment and industrial gas and oil burners.

Luria — Virginia

The Luria Engineering Company has appointed Herbert L. Potts, 5707 Bromley Lane, Richmond, as its Virginia sales representative. The company is a leading designer and producer of standardized steel structures for industry.

Mr. Potts, who is active in Virginia business and civic affairs, has had extensive experience in sales engineering and related fields. He was formerly production manager and labor relations secretary for the Richmond Engineering Company and staff supervisor of ship hull outfitting for the Newport News Shipbuilding & Drydock Company.



CONVERT for EXTRA POINTS

A firing system that's inadequate and expensive may be eating into your profits . . . unnecessarily! Convert to gas—and increase profits—by cutting labor costs, eliminating coal hauling, ash-removal, flue and tube cleaning. Gas requires less maintenance on equipment, increases efficiency and effects greater savings! Present system can usually be retained as a stand-by.

Consult McBurney Stoker and Equipment Company, makers or suppliers of the best boiler room equipment available, on all problems. If your firing system requires wood, coal, gas, oil or any combination thereof, McBurney Stoker and Equipment Company has designed units to fit your particular needs. They have served industry since 1911, and can offer you the finest equipment, including: Copes-Vulcan Boiler Controls, Copes Feedwater Regulators, Vulcan Soot Blowers, McBurney Underfeed Coal Stokers, Aqua Electric Scale Control, Gas and Oil Burning Equipment.

McBURNEY

Stoker and Equipment Co.

SINCE 1911

2110 Peachtree Road, N.E.

Atlanta, Georgia

Phone: Elgin 4436

Pullen Moves to Dallas Office of Byron Jackson

Transfer of R. W. Pullen, as district sales engineer, to the Dallas office of **Byron Jackson Division of Borg-Warner Corporation** has been announced.



"Bob" Pullen has been with BJ since 1952 and most recently was district sales engineer in the Memphis office.

Kuhlman Electric Appoints New Officers

The board of directors of the **Kuhlman Electric Company**, manufacturers of power and distribution transformers, Bay City, Michigan, has announced the election of **George R. Fluehr** to the company presidency. Formerly secretary-treasurer of Kuhlman, Mr. Fluehr will remain treasurer in addition to his new duties. **H. E. Greenwalt** has been named executive vice-president and secretary and general manager.

Westinghouse Expanding Kentucky Lamp Mfg. Plant

Ground was recently broken for a new warehouse addition to the **Richmond, Ky. Lamp Division** plant of the **Westinghouse Electric Corporation**.

The 16,500 sq ft addition will be built onto the rear of the seven-year-old plant, and will increase available floor space to 91,500 sq ft.

Contractor for the construction work is the Hargett Construction Company of Lexington, Ky. Staggs and Fisher, consulting engineers of Lexington, designed the new addition. The construction is scheduled for completion in May, 1956.

Tipp Mfg. Co. — Southeast

Appointment of **H. M. Sawrie and Company**, Professional Building, Chattanooga, as sales representative in **Tennessee, Alabama and Georgia** for Tipp "Cable-Way" conveyor has been announced by the Tipp Manufacturing Company, Tipp City, Ohio.

The Tipp "Cable-Way" is an overhead conveyor system of trolleys riding on a T-rail. It not only helps to increase production capacity, but also frees floor space and utilizes overhead areas for such purposes as temporary storage and visual inventory control.

165,000 kw Extension for Vepco's Brevo Station

Virginia Electric and Power Company has retained Stone & Webster Engineering Corporation to design and construct a new 165,000 kw addition to the Brevo power station at Brevo Bluff, Virginia, which will bring the station's capability up to 265,000 kw. Cost of the new Vepco

extension is estimated at \$22,000,000, with May, 1958, the anticipated date of operation.

The Brevo plant which represented an outstanding design at that time first went into operation in 1931 with two 15,000 kw units. These were later augmented by a 66,000 kw, 1200 psi, 950 F unit installed by Stone & Webster in 1950. Although the original ultimate capacity was anticipated to be 150,000 kw, the new unit will, with its 165,000 kw capability, nearly triple the plant's former capacity. The new unit is the second one of 165,000 kw capacity to be installed by Stone & Webster Engineering Corporation for the Virginia Electric and Power Company system, the other one now being installed at the Yorktown plant near Yorktown, Va.

In 1931 an ultimate station capacity at Brevo of 265,000 kw could not have been planned because the 525 psi, 825 F straight regenerative cycle required 28,500 gpm of circulating water for 15 mw or 1.9 gpm/kw, whereas now it is possible to obtain about four times as much power with the same amount of circulating water.

RADIUS UNLIMITED

with the ALLPAX Extension Gasket Cutter

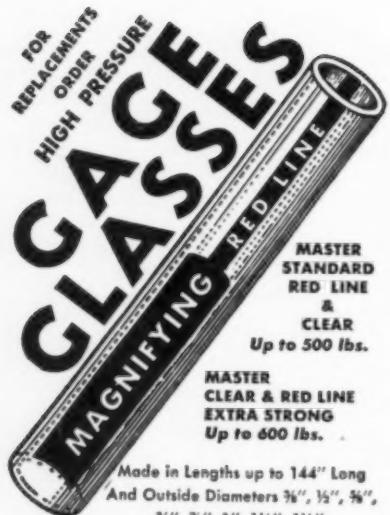
There is no gasket too large to be cut with the Allpax Extension Gasket Cutter. With the simple addition of extra 6" extension arms, the radius can be increased as required. Without extensions this handy, versatile tool cuts diameters from $\frac{1}{4}$ " to 12".

Make replacement gaskets quickly and easily with the Allpax Extension Gasket Cutter and avoid costly delays in operation.

SEND FOR OUR NEW CATALOG TODAY!

See our complete line of packings, tools, and gasket materials. Contact our distributor or write to:

THE ALLPAX COMPANY
805 Mamaroneck Ave. • Mamaroneck, N. Y.



High Pressure Composition ERNST RUBBER GASKETS

All sizes to fit your gages and valves



FIG. 21—Lip Mold



FIG. 22—Standard

ERNST WATER COLUMN & GAGE CO.
Send for Catalog
LIVINGSTON, N. J.

**NATIONAL
AIROIL
FUEL OIL-GAS
BURNERS**
SERVING
INDUSTRY
FOR 43 YEARS

- Steam Atomizing Oil Burners
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- Tandem Block Combustion Units
- Fuel Oil Pump Sets
- Refractory Burner and Muffle Blocks
- Valves, Strainers, Furnace Windows

Detailed information gladly sent you upon request, write on your business letterhead, please.



Established 1912

Incorporated 1917

**NATIONAL AIROIL
BURNER COMPANY, INC.**

1279 E. Sedgley Ave., Philadelphia 34, Pa.
Southwestern Division
2512 So. Blvd., Houston 6, Tex.

News (Continued)

Automatic Feed Mill on College Campus — Kansas

Automation was recently introduced into American college curriculum, largely through the help of the Richardson Scale Co., of Clifton, N. J., which pioneered automatic feed mill operation in the U. S.

Ben Fairless, U. S. Steel Advisory Committee Chairman, addressed the student body and some 1,000 guests gathered for the inauguration of Kansas State College's new full-scale completely automatic feed mill, the first owned by an American educational institution. Kansas Governor Fred Hall dedicated the mill on behalf of more than 350 firms and individuals donating cash and equipment to the school's Department of Feed Technology. In accept-

ing the gift, President James A. McCain stated that this accomplishment was the result of five years of planning by a group of far-seeing businessmen.

The automatic feeder system, with electronic control panel and automatic scales which enable one man to supervise the proportioning and mixing operation, actually automates the entire feed mill.

Turbine Shaft Repair

(Starts on page 58)

Since the turbine thrust bearing had to be removed for the job, temporary centers were installed and the rigging was complete. The actual machine work was routine.

The journal was found to contain other cracks and will be scrapped, but the immediate results of this job were well worth the trouble due to the savings realized in time and money.

North Carolina Terra Cotta Plant

(Starts on page 50)

and corrugations are placed on the spigot end.

The pipe then rolls into an upper ender which places the pipe vertically on the spigot end on a 56" x 72" wooden pallet which is automatically positioned. Each pallet will hold twenty 8" sewer pipe or sixty-three 4" sewer pipe. The loaded pallets are transported by Clark lift trucks to one of the ten dryer rooms for drying.

Drying

The drying building is a brick and masonry building 200 feet wide and 100 feet long. It is divided into ten rooms 19 feet wide. A vertical section of the room would be easier to visualize. The basement is earth floored 7 feet deep which constitutes an air plenum chamber. It is void of any structure except an air duct running down the center parallel to the room's long dimension.

The floor, which is the same elevation as the forming building floor, consists of timbers resting on edge and supported by steel beams. The timbers are separated by $\frac{3}{8}$ " plywood blocks which serve

as nailing centers. The void between the separator results in a slotted floor.

The 2 x 6 timbers are laid at a 45 degree angle with the building. This was done to increase the number of boards which support the wheels of the lift truck as it passes in and out of the rooms.

Ten feet above the wooden floor is a roof of drop tile construction. In the roof are air exhaust openings and openings into a recirculating duct. Air, heated by an indirect heat exchanger is blown into the basement duct by a 28,000 cfm Trane fan.

The air passes into the plenum chamber up through the slotted floor through the ware and to the roof. It can there either be exhausted or recaptured and passed back to the heat exchanger for a new pass through the dryer, depending on the drying cycle.

Each drying room will hold 60 pallets of ware. The drying time varies with the wall thickness of the ware in the dryer but normally it takes 36 hours for complete drying. The temperature during drying is 150 F, which is the finishing

range. Dry pipe from the auger is hauled by fork lift truck to the setting station at the tunnel kiln.

Firing

At the setting station, the dry pipes are manually set on 8 foot x 10 foot kiln cars. Each car will carry 80 stands of pipe. A stand consisting of one 8" pipe with a 4" pipe inside. The loaded kiln cars are propelled by a hydraulic ram to the kiln pre-heater where it remains for eight hours at a temperature of 250 F to insure complete water removal. The car is then transferred to the kiln proper.

Our kiln was designed by Swindell Dressler Company of Pittsburgh, Pa. It is housed in a transite building 68 feet wide and 378 feet long. All of its controls are located at one center. The kiln is 324 feet long and 8 feet wide, and contains 31 cars. It is equipped with 56 North American dual fuel burners for very accurate firing control and a unique brine glazing system.

A tunnel kiln is continuous—at set intervals a car of fired ware is

Do engineers blow too much?

Of course it's better to blow boilers too much than too little. But it does waste money to blow unnecessary heat units down the drain—enough usually to pay in just a few months for a modern system of precise, carefully-controlled, continuous blow-down. To get all the facts gamble a stamp for a copy of the booklet on the Madden Orifice Meter; write to *The Madden Corp., 1543 W. Morse Ave., Chicago 26, Ill.*

removed from the exit end and a car from the pre-heater is inserted in the entrance end. The train of cars is propelled through the kiln by a controlled-speed hydraulic ram. At present, it takes 46 hours for a car to pass through the kiln. The kiln is divided into four main zones. Each zone getting progressively hotter or cooler depending on a pre-determined firing schedule.

Storage

When a car is removed from the exit end of the kiln, it is transferred back to the setting truck where it is unloaded. The finished product is transported either to the yard for storage or to trucks for immediate delivery. The pipe stored on the yard is packaged in bundles of 28 pipes with wire bands. This facilitates re-handling.

Classified Advertisements

Classified rates are net, payable in advance, each month. Rates are based on column inch, with three columns per page, 10 inches per column, column width 2½ inches—a total of 30 column inches per page.

CLASSIFIED RATES

\$8.00 per column inch

\$16 per column inch displayed

Rates quoted on special types of repeated advertisements.

Special "Position Wanted" Advertisements submitted by individuals seeking employment, 10 cents per word per insertion, payment with order, minimum charge \$5.00. When used, Box Number address, c/o SOUTHERN POWER & INDUSTRY, 806 Peachtree Street, N.E., Atlanta 5, Georgia, count as eight words.

RENEW YOUR
SUBSCRIPTION
TO
SOUTHERN
POWER &
INDUSTRY

District Sales Manager

National manufacturer of regulating and control valves requires District Sales Manager for Southern region to work with Sales Representatives. Man selected must have proven sales record to qualify him for advancement and greater responsibility. Salary open. Send resume including educational background, experience, age, references and salary requirements. Write: Leslie Co., 261 Grant Ave., Lyndhurst, N.J.

CASH
FOR USED TRANSFORMERS

Convert your used transformers to cash! Send us a description of them TODAY. Transformers and Coils built to your specifications. Send blueprint, for prompt quotation.

TRANSFORMERS BOUGHT,
SOLD and REPAIRED
40 Years Dependable Service

THE ELECTRIC SERVICE CO.

5323 Hetzel St., Cincinnati 27, Ohio

POSITION WANTED

Master Mechanic with 28 years experience is now employed, but wants change. Well experienced in all types of factory work. Write Box 242, care SOUTHERN POWER & INDUSTRY, 806 Peachtree St., N.E., Atlanta 5, Ga.

THE
HAWORTH
ENGINEERING AND MANUFACTURING
COMPANY

Consulting
Plant Design and
Layout
Birmingham 4, Ala.
Material Handling
Conveying
Phone 54-9543



FLOW INDICATORS

All sizes up to 6"
SEND FOR CATALOG

ERNST
Water Column & Gage Co.
LIVINGSTON, N.J.



Index of Advertisers

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SOUTHERN POWER & INDUSTRY for JANUARY, 1956

BIGGEST THING in YOUR SHOP...

When some rusty bolt or shaft won't let go and it is tying up production . . . it can be the biggest thing in your shop. That is when Kano Kroil, the new chemical loosener, is worth its weight in gold. As one customer put it, "It's like an extra employee."

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You Too Can Get This Result

Try Kroil at our risk. If it doesn't do more than you expect, return it and the charge will be cancelled. Get the Kroiler combination, one gallon of Kroil (regular price \$3.85) and Kroiler squirt gun for \$4.95 f.o.b. factory. Order direct.

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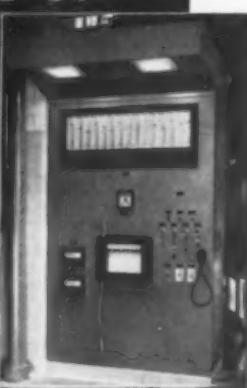
Call, wire or write today for further information . . . there is no obligation.

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Straight-line and Dial types—bell actuated and diaphragm actuated—built for durability and accuracy. Exclusive features such as translucent glass scale, unitized mechanism that can be slipped out of case, practical illumination, nonfogging and dust sealed. A bank of Ellison Straight-Line Draft Gages at the South Shore Destructor Plant, Brooklyn, N.Y., is shown. Send for Bulletins 122 and 124.

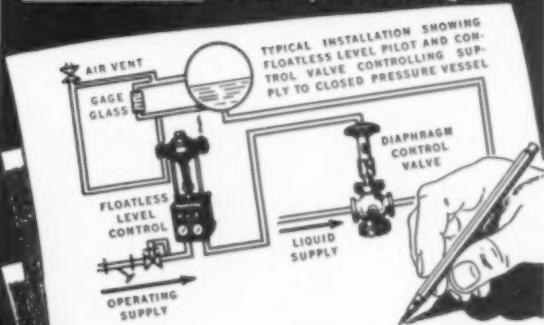
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Simple, compact, one-adjustment unit installed anywhere below liquid level. Diaphragm-stem assembly is only moving part . . . no linkages, torque tubes or floats. Doesn't require recalibration during service. Thousands in service giving instrument control ($\pm 1"$ column of water).



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LEVEL AND TEMPERATURE CONTROLS
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**It's a cinch to clean
any size heat exchanger
tube the Wilson way!**

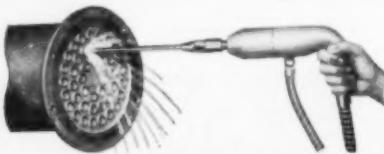
Why put up with the delays and the high costs of makeshift tube cleaning methods? Wilson has exactly the tube cleaner you need to do the job quickly, thoroughly, economically. Wilson's complete line of fast-acting tube cleaners includes the popular PG for $\frac{3}{8}$ " to 1", the PGX for intermediate sizes $\frac{1}{2}$ " to $\frac{1}{2}$ ", and the TP-301 for up to $2\frac{1}{8}$ " ID.

**For Small Sizes
MODEL PG
PISTOL GRIP
TUBE
CLEANER**



The fast, efficient Pistol Grip Tube Cleaner provides the operator with one-hand control for cleaning small, straight tubes. Weighs only 3 lbs—no more than a 12" Stillson wrench.

**For Intermediate Sizes
MODEL PGX TUBE CLEANER**



Positive drive (not geared down) high speed, rotary shaft, air-driven scavenger type cleaner. Washes out tube and debris as it cleans, keeping drill bit cool at the same time. For either vertical or horizontal applications, straight or curved tubes.

**For
Heavy-Duty
Service
MODEL TP-301
TUBE
CLEANER**



Suitable for vertical or horizontal use in straight or curved tubes $\frac{3}{8}$ " ID to $2\frac{1}{8}$ " ID and up to 40' long. Cleans rapidly, thoroughly, operating at high speed at 90 psi. Can run on pressure as low as 50 psi.

Representatives
in all principal cities

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CABLE ADDRESS: "TUBECLEAN" NEW YORK

WILSON
TW 829
TUBE CLEANERS • TUBE EXPANDERS

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Avoided!**

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BULLETIN 143

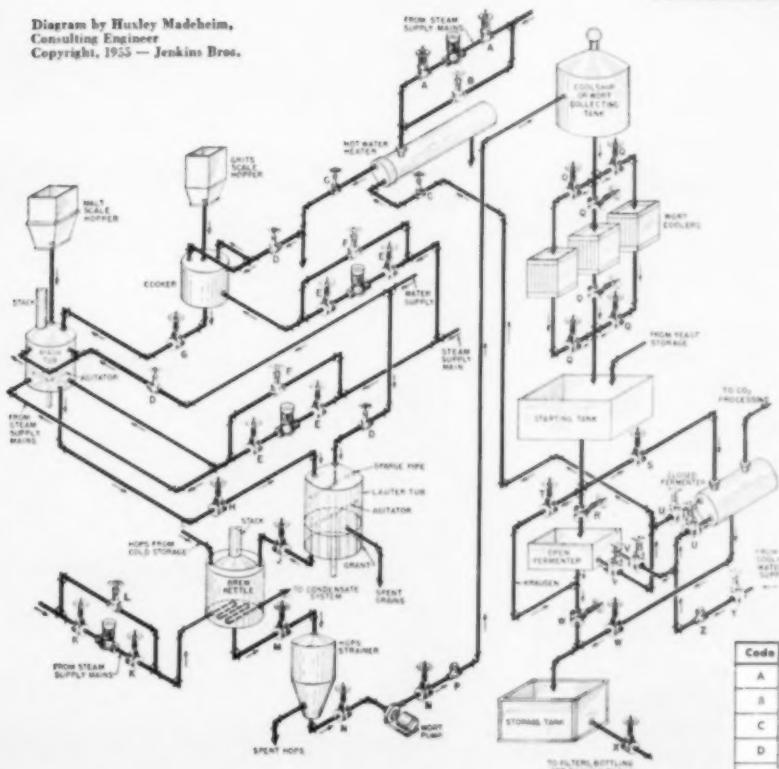
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JENKINS PRACTICAL PIPING LAYOUTS

76

Diagram by Husley Madeheim,
Consulting Engineer
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VALVE RECOMMENDATIONS
For details of valves to suit varying conditions see Jenkins Catalog.

How to plan piping connections for a GRAVITY-FEED MULTIPLE-STORY BREWERY

This piping layout is typical of installations in many breweries designed for gravity-feed processing, and the principal operations are briefly outlined.

Corn grits are cooked with water in the cooker, with enough added malt to convert and liquefy the grits. When the malt, which has been mixed with water in the mash tub, is properly steeped, the finished cook is dropped into it and the resulting mash thoroughly mixed.

Pumped into the Lauter tub, the mash grains settle to form a filter bed, from the bottom of which the clear liquid containing fermentable and unfermentable sugars is drawn. Extraction is increased by "sparging" with hot-water spray. This liquid, the "wort", flows by gravity to the brew kettle.

In the brew kettle, the wort is boiled with hops to add flavor and to clarify and preserve it. The hops are then strained off, and the liquid is pumped to the "cooling" tank to settle. It then goes through

coolers to reclaim most of the residual heat, and on to the starting tank.

In the starting tank, the yeast is added, and the mixture flows to the fermenters, some of which are closed to collect the carbon dioxide gas for future use. After fermentation, the beer is cooled again and sent to storage tanks for eventual bottling and racking.

Consultation with accredited piping engineers and contractors, experienced in brewery design, is recommended when planning any phase of the various processing systems.

To simplify planning, select all the valves you need from the complete Jenkins line. It's your best assurance of *lowest cost in the long run*. Jenkins Bros., 100 Park Ave., New York 17.

Complete description and enlarged diagram of this layout free on request. Includes additional detailed information.

Code	Quan.	Jenkins Valve	Service
A	2	Fig. 275 Bronze Gate	Shutoff steam to heater
B	1	Fig. 556-P Bronze Globe	Bypass to heater
C	2	Fig. 47 Bronze Gate	Shutoff water line
D	3	Fig. 106-A Bronze Globe	Continuous water flow
E	4	Fig. 204 I.B. Gate	Process steam shutoff
F	2	Fig. 576-P Bronze Globe	Bypass water valve
G	1	Fig. 677-A Bronze Gate	Shutoff cooler mesh
H	1	Fig. 677-A Bronze Gate	Shutoff finished wort
I	1	Fig. 677-A Bronze Gate	Shutoff wort to kettle
K	2	Fig. 204 I.B. Gate	Shutoff steam to kettle
L	1	Fig. 576-P Bronze Globe	Bypass to kettle
M	1	Fig. 677-A Bronze Gate	Shutoff wort line
N	2	Fig. 677-A Bronze Gate	Pump shutoff
P	1	Fig. 352 Bronze Swing Check	Prevent backflow
Q	6	Fig. 677-A Bronze Gate	Shutoff coolers
R	1	Fig. 677-A Bronze Gate	Shutoff open fermenter
S	1	Fig. 677-A Bronze Gate	Shutoff closed fermenter
T	2	Fig. 677-A Bronze Gate	Krausen line
U	2	Fig. 675-A Bronze Gate	Water to closed fermenter
V	2	Fig. 675-A Bronze Gate	Water to open fermenter
W	2	Fig. 677-A Bronze Gate	Shutoff storage
X	1	Fig. 677-A Bronze Gate	Shutoff rock & bottling
Y	1	Fig. 675-A Bronze Gate	Shutoff well water
Z	1	Fig. 352 Bronze Swing Check	Prevent backflow

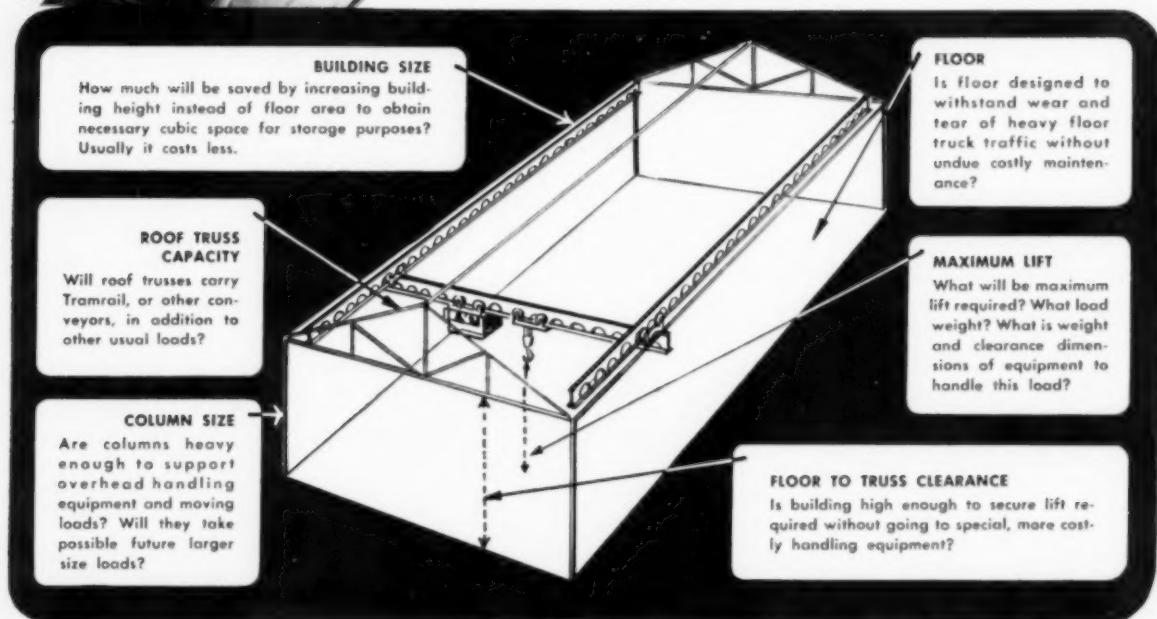
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LOOK FOR THE JENKINS DIAMOND
VALVES



Jenkins Bros.

Don't Forget Materials Handling When Designing the Building



The foremost demand of a new factory building, whether for production or storage, is that its design and construction aid overall operating efficiency to the utmost. Thus, the building becomes more than just an enclosure, but is actually a vital part of the manufacturing process.

It is, therefore, imperative that the various steps entering into the making of an item be thoroughly considered when the building is designed. One of the most important of these concerns materials handling because this item often amounts from 25% to 50% of the total production cost, and, also, because it is plant-wise in nature.

Regardless of what handling methods are deemed best, overhead cranes or Tramrail, roller or chain conveyors, floor trucks, etc., the building design, size and construction usually has a tremendous bearing on the ultimate handling efficiency secured. Building clearances, floor construction, column locations, aisleway allowances and other factors must be considered for the different handling methods for most satisfactory results.

For initial economy in installation, for most satisfactory operation and highest efficiency, plan for materials handling when you design the building. ***Do not make materials handling an afterthought.***

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